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national society for clean air
136 North Street, Brighton BN1 1RG. England



An eagerly awaited source of information for all those involved or interested in the Lead debate.

LEAD VERSUS HEALTH

Sources and Effects of Low Level Lead Exposure

edited by **Michael Rutter**, *Professor of Child Psychiatry, London*, and **Robin Russell Jones**, *Deputy Chairman, CLEAR, London*.

The effect on health of low level exposure to lead continues to attract widespread attention and controversy.

This book represents the most comprehensive and up to date work on the subject by a group of international authorities who participated in a symposium entitled 'Low Level Lead Exposure and its Effects on Human Beings', which took place in London in May 1982. The purpose of the symposium was to allow a rigorous, critical and thoughtful reappraisal of the evidence on the effects of low level lead exposure, and to assess its implications.

The association between blood lead concentration and lead levels in petrol is critically re-examined in the light of new research findings in the UK, USA and Europe. There is discussion of methodology used for measuring lead in the environment, of legislation and control on an international basis, and of the specific disease syndromes, both physical and psychological, associated with lead exposure in adults and children.

This book will be an eagerly awaited source of information for all those involved or interested in the lead debate. It will be essential reading for paediatricians, neurologists, psychiatrists, psychologists, environmental toxicologists and public health authorities, and will be of interest to everyone concerned with the wider implications of environmental and ecological protection.

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CONCLUSIONS Low Level Lead Exposure: Sources — Effects and Implications — **Michael Rutter**.

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'AIR POLLUTION CONTROL'

The long-awaited official response to the Fifth Report of the Royal Commission on Environmental Pollution has all the impact of a damp squib. Successive governments have between them spent *seven years* considering the many important proposals made by the Royal Commission. Political procrastination has meant that some matters, such as air quality guidelines or standards, have been overtaken by events. But this inordinate delay has also enabled the various executive arms of government to consolidate the present arrangements for air pollution control and parry the thrust of the central recommendations for a unified pollution control inspectorate, and the return of the Alkali (Industrial Air Pollution) Inspectorate to DOE. Mr. Heseltine's failure to endorse the latter proposal, which was so strongly supported by this Society, the CBI and the IEHO, is all the more disappointing since he complained, in 1979, about the Labour Government's failure to return the Inspectorate to its former home.

'Air Pollution Control' is really a 'holding position' statement, and an apologia. It lends support to the concept of "the best environmental option", without promising much more than: "... discussions with representatives of the authorities concerned in order to provide a forum for discussion on the issues involved"!

Royal Commission recommendations that have been turned down (apart from HMPI) include: a system of consents rather than registration of scheduled works, and wider public participation in determination of bpm; a specific requirement on local authorities to take account of the need to conserve and improve the environment; and a "buffer zone" policy. Among points accepted is that pollution policies have a justifiable place in planning and should be embodied in both structure and local plans. Good news — if a little like shutting the stable door ...

The real hope for the future must lie in the comprehensive review of air pollution legislation on which the Government intends to embark this year. DOE is already up to its ears in formulating acceptable policies on coal burning, LRTAP and other hot issues, but the review gives us all the chance to design a strategy which will meet the needs of this and coming decades; we should seize the opportunity, and make sure that we won't, like Lord Flowers and his fellow Commissioners, have to cry in the wilderness for seven long years.

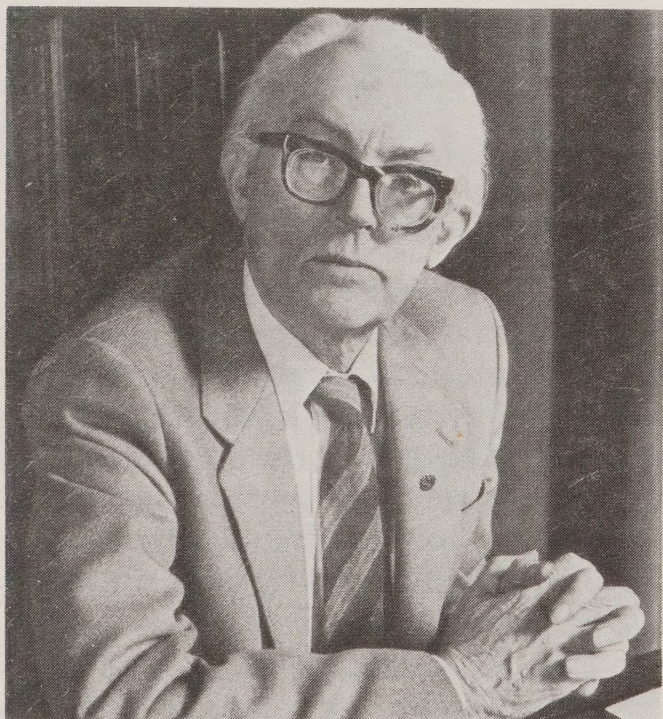
REPORT ON THE 1982 CONFERENCE

by

Jane Dunmore

The combination of the Llandudno venue and the topical and varied conference programme attracted 275 delegates to the 1982 Clean Air Conference, a marked improvement on attendance the previous year. Even in October, Llandudno is a beautiful resort and the new Canolfan Aberconwy Centre offers excellent facilities for conferences. The main hall was large enough to seat all the delegates and provide exhibition space at the back for the dozen or so stands mounted for the event.

With the conference opening on Monday night, and three days of sessions, morning and afternoon, on the Tuesday (Coal and the Environment), Wednesday (Noise and the Community) and Thursday (a mixed bag) there was a full schedule of business.



Michael Foot, MP, PC, Vice President of the NSCA

As at Brighton in 1981, conference was preceded by the Society's Annual General

Meeting, at which *Mr. Bernard Twyford* was elected to succeed *Mr. H. Giblin* as Chairman of the Society, *Councillor Len Poole* and *Mr. Max Beaumont* being elected Deputy Chairmen. *The Rt. Hon. Michael Foot, MP*, was elected Vice President of the Society and will hold this honorary office for a period of 3 years. Mr. Twyford said that he was delighted that Mr. Foot had accepted the nomination and that his support for the Society's aims and work would be invaluable.

The Worshipful the Mayor of Aberconwy, *Councillor H. Rhys Hughes*, greeted Welsh delegates in their native tongue, switching to English for the benefit of the foreigners. The Keynote address which followed the official opening was given by *Lord Flowers, FRS*, on the theme of Coal and the Environment. Lord Flowers, who served as Chairman of the Standing Commission on Energy and the Environment (CENE), reviewed the Commission's study of coal which he said has been addressed to those who were dubious about the future of the British coal industry "and not without reason, for it could easily price itself out of the market". He felt that the industry had a tremendous contribution to make to meet Britain's future energy requirements but warned that investment should be geared to modernisation, since it gave the opportunity to phase out obsolescent capacity in areas whose decline is associated with the worst environmental legacy of the past. Speaking of this "bitter heritage", Lord Flowers referred to the past association of a flourishing coal industry with uncontrolled subsidence, towering spoil heaps and the problems associated with opencast mining. In all

three areas, the coal industry would have to be particularly careful in future. Open-cast mining could not be allowed to continue unchecked, even though it is the profitable arm of the industry.

Lord Flowers emphasised the importance of coal supplies for the electricity generating industry. Although no new fossil fuel power stations are planned, power stations will continue to be the major user of coal, certainly until the end of the century. In the industrial sector generally the NCB have hopes that there will be a massive switchback from oil to coal. When CENE were considering their report, they felt that local authorities were generally unaware of the possible scale of re-entry of coal into the industrial market. However, as could be seen from comments at both this and the last Clean Air Conference, local authorities are now fully awake to the possibility and its implications, and have taken on board the task of maintaining or improving air quality while at the same time encouraging industry to develop, especially in recession — hit areas.

The CENE report appeared to play down the prospect of severe air pollution problems, except for those of a particularly local nature. Certainly, they were not brought into focus in the same detail and with the same sense of urgency as were problems of subsidence and spoil disposal. However, in his conference address, Lord Flowers gave rather more emphasis to protection of the atmospheric environment. While he felt that smoke was no longer a problem, with large-scale users such as power stations employing electrostatic separators which work to an efficiency of 99.5%, he stressed the continued uncertainty and concern about the effects of carbon dioxide and sulphur dioxide emissions. International debate on LRTAP was forcefully renewed during

1982; the Commission had hedged their bets on acid deposition by saying that desulphurisation research should certainly continue, although Lord Flowers warned that such a solution to the problem would be very expensive. Carbon dioxide, he said, was a global problem to which global solutions would have to be found if and when anything had to be done.



Lord Flowers delivers the Keynote Address; chairing the session: Mr. W.B. Twyford

Lord Flowers turned finally to the application of the planning process to securing an acceptable environment in relation to energy policy. The CENE report made a number of proposals for streamlining the system of inquiry, from provision of better information to the public at the outset, to a more detailed and regular review by Government of the energy scene. He considered the British town and country planning system to be astonishingly versatile when properly used "hence much of the objection to the formal continental and American processes of environmental impact assessment."

One of the most attentive of Lord Flowers' audience was the Society's President, *Naomi Sargant* (Naomi McIntosh), who was herself a member of CENE. She had made the journey to Llandudno despite a painful back injury and the imminent launch of Channel 4 TV. She addressed the conference briefly but forcefully during the Opening Session, stressing the impact that the environmental movement could have through television and the advantages that the medium offered for public education.

Changeover to coal — technical and economic incentives for industry

Lord Flowers' speech set the scene for the first full day of conference on Tuesday 19th October. *Dr. Joe Gibson* of the National Coal Board and *Peter Reynolds*, Director of Babcock Power Ltd., Shell Boiler Division were the opening guest speakers. Mr. Reynolds, discussing the transition to coal in industry, stressed that any change in primary energy for industry was a relatively major step and one which had to be warranted over the full life of the plant. Small industrial establishments would, he thought probably remain dependent upon gas or oil, but it made sense for medium and larger industries to change progressively to coal by the purchase of new plant, providing that the cost was right and that site space was available. He outlined the criteria for selection of boiler plant, summarising the different types of plant for various applications, and the available gas clean-up technology. He gave a useful indication of the cost of various dust collectors, and covered other aspects such as coal and ash handling and the training of operators. He pointed out that the 35% cost advantage of coal to any energy related business meant that in most cases the capital expenditure tailored to

meet their needs could be paid back in two to three years.

Dr. Gibson spoke of developments in coal handling and coal combustion, work that had been initiated by the NCB in 1972 to make coal more attractive to industrial users. He felt that fluidised bed combustion was particularly important, being immune to changes in coal type, particularly amenable to automatic control and facilitating a reduction in emissions (although with the penalty of higher capital and operating costs). He referred to improvements in coal conveyance and ash handling which also ensured that coal firing could offer a degree of cleanliness previously associated only with oil or gas firing.

Local authority reservations

Discussion opener *Bob Lander* of Middlesbrough Borough Council, referring to the CENE report, expressed the hope that the NCB would have learned a lesson from the past and would in future ensure minimum adverse environmental effects when extracting coal. He had reservations about the projected return to coal use in industry, particularly with regard to grit and dust arrestment. Electrostatic precipitators were obviously impractical for small and medium sized installations burning coal other than PF; the preferred option would probably be a combination of settlement chambers and mechanical collectors. The two speakers had made it clear that the technology existed to rebuild the coal burning industry and to protect the environment at a cost, but it was at this point that industrialists and environmentalists diverged. The industrialist was bound to consider a cost-benefit analysis in relation to his business while the environmentalist was concerned with the cost-benefit analysis as it related to the

protection of the environment, either to seek improvements or simply to protect that level of clean air which had already been achieved.

Other local authority delegates shared Mr. Lander's reservations. *Ivor Barker* of Sheffield City Council was disappointed that the technical developments referred to by both speakers seemed to be no more than modifications of technology which was already 50 years old, and called for the development of new technology more in keeping with the 20th Century and the challenges of the 21st century.

Solid Fuel and Smoke Control

The afternoon session began with a new audio visual presentation by the Solid Smokeless Fuels Federation, following which a discussion on the use of solid fuel was led by a team of four invited speakers: *Colin Kibbler*, Managing Director of Rexco Limited; *Roger Pane*, Marketing Director, Coalite Group PLC; *Robert Payne*, NCB Coal Research Establishment; and *Michael Sambrook*, Marketing Director of National Smokeless Fuels. The panel faced some fairly intensive grilling from the audience and had to tackle such diverse problems as a bottleneck in solid smokeless fuels' distribution up in Doncaster, the relatively high cost of smokeless fuels compared with coal, and the pollution created during the processing of smokeless fuel. Agreeing with *Cllr. Laurie Harrison* of Wakefield MDC that there were problems with distribution, particularly in unexpected cold snaps in the winter months, *Roger Pane* made a plea for merchants to carry sufficient stocks to see them through periods of heavy demand or disrupted supply. On the question of price, which had been raised by *David Bird* of Sheffield, *Mr. Sambrook* agreed that producers would

ideally like to see coal and solid smokeless fuels sold at identical prices. However, one tonne of coal could not be turned into one tonne of smokeless fuel without a loss in yield of between 30 and 50%. In selling coal to the manufacturers, the NCB made concessions which allowed for the fact that the producers would have to spend money processing the fuel. The Coal Board were concerned that the differentials should not widen since they too wanted to maintain the largest possible market for solid fuel.

Educate the householder

Colin Kibbler felt that many council tenants were insufficiently informed about solid fuel and the most efficient ways of using it. He knew that guidance leaflets were issued to householders when an expensive appliance such as a roomheater was installed in local authority houses, but he wondered what happened to the leaflet when the house changed hands. He considered that there was scope for further education by local authorities, to ensure that appliances were properly used.

Smoke eater prospects

Ian MacPherson of Glasgow D.C. challenged the panel on the whole question of coal burning; he considered that coal was far too valuable a resource, as a chemical feedstock, to be burnt, and that it was nonsensical to design an appliance which would burn raw coal smokelessly. *Roger Pane* (Coalite Group) agreed that a smoke-eater appliance was a marvellous concept but in his opinion it remained an idea to be aimed at but never to be achieved. If the appliance could be made totally idiot-proof, the concept would work, but as he did not think that this had yet been achieved, he suggested that the use of manufactured solid smokeless fuel was the

proper alternative which would guarantee the cleanliness of the air in the UK's towns and cities. *Robert Payne* (Coal Research Establishment) pointed out that each smokeater appliance underwent a strenuous series of trials and tests and that the after-sales servicing was also followed up by NCB in order to establish any faults and iron them out at a later development stage.

The environmental costs of manufactured smokeless fuels

The question of pollution arising from the manufacture of solid smokeless fuel, was raised at the beginning of the session by *Martha Brejcha* of Munich University, and vigorously pursued later in the day by *Mr. M. Jones* of Cynon Valley BC. Mr. Jones had spoken on the subject of pollution from the Phurnacite plant at Abercwmboi at an earlier Clean Air conference. The NSCA later sought government money to modernise the plant, so that the end product and jobs could both be maintained without the local environment continuing to suffer. However, the £35m. plan for the installation of a new "Ancit" plant was turned down by the government and National Smokeless Fuels/NCB could not afford to spend that sum of money on what was currently a loss-making plant. *Michael Sambrook* (NSF Ltd.) explained that after investigation into pollution at the works had been carried out by a team which included representatives of NSF, the Local Authority and independent consultants, a 14 point programme of anti-pollution measures had been agreed and started upon in 1979. The total commitment by NSF ran to over £4m., of which £3m. had already been spent. However, the inherent problems of the disticoke process placed a finite limit on what could be achieved. The Ancit process

was considered to be the best technical and environmental alternative to the disticoke process and NSF had not abandoned it.

Can Britain meet the EC Directive limits?

Dr. Williams discussed in some detail the means by which local authorities could predict air quality in their own areas, using a mathematical box model. The model could be used to calculate estimates of winter average smoke concentrations arising from the combustion of a range of tonnages of coal in areas of different size. Thus, the impact of increased coal use in any particular community could be assessed in advance.

Smoke control progress and enforcement was discussed in relation to UK legislation and the EC directive. *Dr. Martin Williams* of Warren Spring Laboratory presented a paper, written jointly with *Mrs. B. Gooriah*, which analysed the historical trends in smoke concentrations in the UK in the light of increased smoke control and changing patterns of fuel use. In 1981/2 the number of sites breaching the Directive rose from 11 to 81, in most instances because of elevated smoke concentrations. Dr. Williams was at pains to point out that that winter had been characterised by the coldest December of the century and the rise was sharply against the trend of reductions in sites breaching the EEC directive limits values in the last few years. The analysis performed by Warren Spring suggested that smoke control was the most effective method in most areas of the UK for ensuring compliance with the Directive limit values.

NSCA surveys

John Langston, Secretary General of the National Society for Clean Air, presented the results of the NSCA surveys into

bituminous coal burning in smoke control areas and enforcement of clean air and noise legislation. The sale and use of bituminous coal in smoke control areas has been on the increase in recent years. The Society felt that the problem should be quantified and a survey of all local authorities with smoke control areas was carried out to give a full picture of current trends. The results showed a marked regional variation in the extent and precise nature of the problem but it was clear that traders and householders have been flouting the law on an increasing scale.

Of the 113 local authorities which responded to the survey, 19 (or 17%) considered the burning of bituminous coal in SCOs to be a sizeable or significant problem and 40 (or 35%), while less alarmed, nevertheless felt that it was a "cause for concern".

Air Cdre. Langston emphasised that once started, illegal coal burning could quickly become widespread. Where infractions occurred, most local authorities issued general warnings in the first instance and were reluctant to prosecute, particularly in the case of old age pensioners and low income families. Several local authorities considered that residents in long-established smoke control areas were often unaware of the requirements of the law and reverted to coal burning on economic grounds. Several local authorities also stated that they did not have the resources to monitor smoke control and that therefore low priority was given to its enforcement. In England, the problem was mainly "corner shop" sales of bagged bituminous coal, or, in some areas, illegal use of miners' concessionary coal. In Scotland, the main difficulty lay in coal sales off the back of lorries in smoke control areas, and *Frank Feeley* of Glasgow City Council described the Scottish

Division, NSCA, initiative to secure licensing of such traders.



Conference session in progress

Ivor Barker referred to Sheffield as a pacemaker in implementing smoke control areas. The whole of the city is now covered by operative smoke control orders, yet two of the five air pollution monitoring stations in the city have been identified as approaching the EC Directive limit values, because of bituminous coal burning on domestic grates within certain smoke control areas. In one small area, more than 400 householders were found to be burning coal during a two day survey. Written warnings and follow-up surveys reduced the number of contraventions and eventually 13 householders were successfully prosecuted, along with two coal merchants who delivered coal. But, said Mr. Barker, such action was highly manpower intensive and its effectiveness was purely local.

Eric Foskett, of Manchester City Council, was one of the instigators of the NSCA survey of fines levied in Magistrates' courts. He described the concern expressed within the Manchester Area of Clean Air and Noise Control about the apparently low level of fines imposed for breaches of the Clean Air Act in that area. The Council

subsequently wrote to various organisations, asking for information on typical fines in other areas, and the NSCA survey had been designed to provide such details and to establish the policy of local authorities in relation to breaches of the legislation.

Noise Control

The role of public education

Strategies for noise control were explored by three speakers on the Wednesday morning. *John Bickerdike* of Leeds Polytechnic advocated a full programme of public education in order to create awareness of the problem of noise and shape future patterns of behaviour. He criticised government policies on noise control: powers to control noise nuisance were introduced by the Control of Pollution Act 1974 but complaints have continued to rise. He felt that while the public is more aware of the impact of noise, no efforts are being made to explain either legislative or technical controls. People have to be aware of both their rights and obligations within the law as well as the effects of noise and what can or should be done to control it. He said that local authorities, and Environmental Health Departments in particular, should try to raise the levels of public awareness of noise problems and suggested that domestic noise might be a good area in which to make a start. Teachers, community health workers, professional associations and the NSCA could also play an important role. The axing of the Noise Advisory Council (NAC) was, he said, a disaster. A body which could look at the whole range of noise problems and determine priorities was essential.

Planning for noise control

Mike Ankers of Manchester City Council advocated wider use of powers under

planning legislation to control noise. His defence of the use of planning powers to control noise was made in the light of criticism which has been levelled at Environmental Health Departments for allegedly seeking to duplicate, by the use of the planning act, powers available under alternative legislation which should more properly be used to achieve the objective of noise and pollution control. For various economic and political reasons, planning authorities are now looking closely at the way in which adverse decisions or conditions attached to planning consents may affect economic processes or cause unacceptable delays. He felt that the current vogue was to regard planning as an essentially permissive process and look upon any attempt to restrict or regulate as being unnecessarily obstructive and economically undesirable. The Control of Pollution Act, part III, provides an alternative to the use of planning powers, but while planning laws would uphold amenity, COPA referred to "nuisance", a term which lacked the advantage of precise definition but was generally taken to mean 'unlawful interference with rights over land'. He pointed out that the definition was imprecise and variable according to circumstances; the degree of disturbance had to be "substantial" and control was generally available only over fixed sources of noise, that a best practicable means defence might be applicable, that acceptable levels of noise were not necessarily synonymous with desirable levels, and that post-operative remedies were invariably more costly than preventative measures taken at the design stage.

Noise Abatement Zones — efficacious in every way?

John Barraclough of Calderdale MBC spoke on noise abatement zones and whether they could be made to work. He pointed

out that noise abatement zones (NAZs) provide the basis for effective co-operation between government, industry and commerce, and the domestic sector. The challenge to local authorities lay in showing that the controls would benefit the community, and then carrying them out successfully, with full commitment. Mr. Barracrough's paper attracted comment from both proponents and opponents of noise abatement zones. Discussion opener *Dave Clark* of Middlesbrough BC declared himself at once a supporter of NAZs. He found many of Mr. Barracrough's comments controversial, but he also seemed to feel that Mr. Barracrough had been over cautious in his justification of the need of noise abatement zones.



Mike Ankers, John Bickerdike and John Barracrough during the discussion on noise control

Howard Nowell of Bath City Council felt that local authorities should direct their attention towards education and enforcement rather than consume time and resources in a costly noise abatement zone policy directed towards control of

industrial noise, for which adequate measures already existed. *Ken Teesdale* of Ford Motor Company fully supported the need for effective education programmes but asserted that since the Government had turned its face against central planning QUANGOs and local regional bureaucracies, the only approach left was one of direct campaigning and opposition. Some effective action needed to be taken to create a middle ground: central government had to interest itself in a positive way in reducing the adverse effects of all pollutants; some kind of co-ordinating body was desperately needed and grass roots support was vital in order to convince the local people.

David Bird of Sheffield City Council attacked the policy of noise abatement zones on the grounds of staff time and resources which made them costly particularly at a time of local government claw-back. Noise abatement zones on a small scale could be used as an adjunct to planning control, but their success should be carefully monitored. He was deeply opposed to the concept of a programme of noise abatement zones; there were tight criteria for the selection of zones and they could only be made to work in very specific locations.

Heavy Lorries

The debate on whether lorry weights should rise, and what effect heavier lorries would have in the UK, has continued to rage since the publication of the Armitage report in 1981. Transport Minister David Howell, announcing a new 38 tonne maximum weight, said that permitted noise levels would be cut by 3 dB in April with further reductions in 1984 (in line with EEC requirements). The Government view is that these lorries will have no more, and

perhaps less, impact on the environment than existing vehicles, but heavy lorries have been strongly criticised by many different groups in the last few years, chiefly on the grounds of noise and vibration. Traffic noise is the most widespread and probably the most disliked form of noise pollution and research has shown that at least 23% of the residential population is bothered by traffic noise, with 8% seriously bothered.

TRRL project — the QHV

In the light of all this, the development of the quiet heavy vehicle by TRRL must be considered a tremendous boon and a great advance. When the successful completion of the project was first announced it was expected that the production vehicles of this type would be on the road in 1985. *John Tyler*, formerly of TRRL, as Manager of the project lived through the problems to eventual success, and then had the disappointment of having achieved a spectacularly improved vehicle which no one wanted to use. The Government has not promoted the vehicle in any serious way and manufacturers will obviously need some sort of incentive in order to spend the extra money on the quietening techniques which were evolved through the project.

Mr. Tyler said that while there would be increased costs associated with quietening heavy vehicles, which would initially be borne by the manufacturers and hauliers, ultimately to be passed on to the consumer, he felt that the public would be prepared to pay a small incremental amount to obtain quieter vehicles.

Mr. G. Holmes of Reading Borough Council expressed his fear that the public in general, and even MPs, had been misled into accepting heavier lorries by spurious

arguments. Claims that transportation by heavy lorry was more economical could only be justified because the public was subsidising haulage firms through damage to roads, bridges and buildings. While he did not think it possible to get rid of heavy lorries, he was emphatic that heavier lorries should not be brought in until the roads were safer and vehicles quieter.

Construction Site Noise

Construction activities are inherently noisy and often take place in quiet areas near offices and homes. *Richard Clough* of Wimpey Laboratories discussed planning for noise control and noise control on construction sites already in existence, giving a case study as an example of good practice. His case study emphasised the importance of good public relations, to explain each part of the construction development to those likely to be affected and set out the objectives of noise control measures. Mr. Clough raised a few hackles by saying that the prime responsibility for controlling construction site noise lay with the local authorities' Environmental Health Departments, under powers granted by the 1974 Control of Pollution Act.

Discussion opener *Geoff Charnley*, Southampton City Council, said that while LAs had the enforcement role, he believed that industry should thoroughly accept their responsibility for complying with LA requirements and taking a positive approach to noise control at each stage of the work. He suggested three guidelines for construction and demolition contractors: to think about the likely effect of the operation and act accordingly, to time the operation, so that work would take place when it would cause least disturbance, and to tell both the Local Authority and local residents what was happening

what the effect would be and what measures were being taken to protect the public. In reply, Mr. Clough stressed that he had not been trying to evade the contractor's duty to work in a responsible fashion but had been referring to the existing legislative requirement.

Air Pollution and Health

On Thursday morning the principal theme was the effects of air pollution on health, with papers presented by *Robert Waller*, DHSS, *Dr. Malcolm Fox* of Leicester Polytechnic and *Michael Quinn*, DOE. Mr. Waller discussed the longer term effects of pollutants in the 'micro' environment — indoors and at specific locations such as roadsides. Dr. Fox reviewed air pollution in buildings and underground facilities, notably car parks, and Mr. Quinn presented the findings of the two Blood Lead Surveys carried out in the UK as required by the 1977 European Community Directive. *Dr. Katie Saunders* followed with a paper on the effects of air pollutants on materials, highlighting in her presentation the latest developments in research on atmospheric corrosion processes.

Mike Gittins of Leeds City Council faced a daunting task in leading off the discussion on such a range of specialist presentations; he was more than equal to the challenge, and questioned all four speakers most pertinently, but not over-critically. He congratulated them on achieving a good balance between the technical information required by some delegates, and the more general approach preferred by others. He said that Malcolm Fox, together with Ivor Barker of Sheffield, had made an important contribution to the understanding of problems associated with carbon monoxide in car parks, and local authorities should be aware of both the clean air and health and

safety implications of their findings. Mr. Gittins criticised the DOE circular on lead in the environment as "rather a non-event, with Marsham Street once more sitting on the fence". The ethics of blood lead sampling, only lightly touched upon in Mr. Quinn's paper, were, he said of great concern to him and to other local authority officers, and he sought further advice from the speaker. Mr. Quinn said that there were wide local variations as to whether ethical committees would allow blood lead surveys to be carried out. Venous sampling in particular was regarded by some as an assault on the child.

Government should finance environmental lead surveys

In the general discussion, much of the questioning was on issues related to the blood lead surveys. *Des Wilson* of CLEAR said that the NSCA's well-balanced policy on lead in the environment was the correct one, and he warned that people should not be led into complacency by the figures presented by Mr. Quinn. *Mr. S.J. Garrod*, Oxford City Council, pointed out that no finance had been made available to local authorities to enable them, as charged by Government, to monitor environmental lead levels. Mr. Quinn responded by saying that he would take the message back to those who controlled the purse strings. *Cllr. Heydeman* of Reading BC was critical of the statistical method used in presenting the results of the surveys; Mr. Quinn said that a standard procedure had been used, in order to provide a sound basis for comparing levels between surveys.

Agriculture and Minerals

In the afternoon, *Nevil Parkinson* of Selby DC and *Jeff Sidebottom* of East Yorkshire

BC gave a lively and original dual presentation on air pollution created by agriculture and the need for further controls. Their recommendations on such diverse problems as the use of rain guns to pump sludge onto land, pollution of water-courses, and straw and stubble burning were on the whole poorly received by the representatives of the NFU who had been invited to attend the session. However, most delegates seemed to support the need for further controls on the agricultural industry, while accepting that many farmers were responsible members of their local community and tried to minimise the impact of their activities.

The same applies to the quarrying industry, according to *Dr. Adrian Ellis*, HM Industrial Air Pollution Inspectorate, who spoke on the control of air pollution in the minerals industry. Much still remains to be done to reduce the level of justified complaints from people living in the vicinity of quarries and minerals works, but plant is being updated and improved procedures and controls have been implemented. *Cllr. Jane Inglefield*, who is on the High Peak BC, said that her Council wanted quarry owners to be more conscious of the impact of the industry outside the quarries; the transportation of roadstone and ancillary products had a very wide impact on the environment and gave rise to many complaints.

The Proceedings of the 1982 Conference have been published and are available, price £7.95 complete, from the Society's Brighton office. Individual papers are also available, price 95p each.

Social Events

Relaxation from the flow of information and the pressures of debate was provided each evening, with an informal gathering on the Monday evening, a conference party with cabaret on the Tuesday, and a Civic reception hosted by the Mayor and Mayoress (who took a generous interest in the whole proceedings) on the Wednesday. The performance of the Welsh choir at the last event, which was greatly appreciated by those present, demonstrated the warm welcome given to the Conference by Llandudno and by Wales.

50th Conference

The next NSCA Conference, to be held in Torquay, 31st October to 3rd November 1983, will be the 50th, and to celebrate this landmark a major programme has been devised on the following broad themes: Air pollution control in the United Kingdom; Acid Rain; Nuisance; Noise; Environmental problems associated with smaller industries; Major environmental hazards and the protection of the community.

We look forward to welcoming you at Torquay, and to hearing your views on what should be achieved in the next 50 years.

NEW EXEMPTED FIREPLACE

An industrial scale woodwaste burning boiler has been exempted from the provisions of Section 11 of the 1956 Clean Air Act, and may thus be used in smoke control areas providing the conditions set out in SI 1982 No. 1615 are complied with. The APE Saffire Boiler is manufactured by Air Pollution Engineering Ltd. of St. Thomas Road, South Wigston, Leicester LE8 2TP (Tel: 0533 7852 82).

NEWS IN BRIEF

CALL FOR EXTRA SMOKE CONTROL FINANCE IN COAL MINING AREAS

Results of an air pollution survey presented to the Environment and Planning Committees of South Yorkshire County Council show that 29 out of 33 sites within the metropolitan county failed to meet the EC limit values for smoke and SO₂. Most failures are the result of very high peak values.

The figures reported are the latest available on a yearly basis, for April 1981 — March 1982. While 1981/2 was a much colder than average winter, evidence from Warren Spring Laboratory and the Department of the Environment suggests that smoke and SO₂ levels in some parts of the Metropolitan county will breach the Directive limit values which should be met by 1 April 1983. While derogations may be permitted for specific areas, the UK must demonstrate that it is acting to bring pollution concentrations down as quickly as possible, and by 1993 at the latest. South Yorkshire County Council fears that unless specific additional financial allocation, from central government or the EEC itself, is made available to areas such as Barnsley, Doncaster and Rotherham, progress will be slow. Districts like Barnsley MBC, where 11 new smoke control areas came into operation during 1981 and 1982, have to spend more on smoke control than equivalent non-mining areas because of the high number and greater average cost of conversions.

Cllr. Ken Willers, chairman of the County's environment committee, said that district councils in South Yorkshire faced a difficult task when trying to persuade coal mining communities to change the habit of generations and stop burning coal on open grates, and the finance required was a considerable burden on the councils. The metropolitan county will be appealing to Government and the EEC for greater financial support, both for smoke control and for air pollution monitoring.

MOULDED PAPER LOGS

There has been considerable concern expressed within the Society about the marketing of moulds which compress wet paper into logs which are then dried and used for fuel. Advertisements generally describe the logs as having a heat output comparable to wood and/or low grade coal, and state that they burn cleanly and smokelessly. However, the moulded logs have *not* been authorised for use in smoke control areas and members of the public who are tempted by the thought of "free" fuel should not be misled into thinking that the logs can be burnt in smoke control areas.

Bob Lander, Chief Environmental Health Officer of Middlesbrough and a member of the NSCA's Council, spotted an advertisement in a mail order catalogue which actually claimed: "the moulded logs can be used in smokeless areas". He wrote to the mail order firm pointing out that it would be an offence for anybody to burn those paper logs in a fireplace contained within smoke control areas and asked the company to

make all their agents aware of the law. The British Mail Order Corporation Limited responded promptly to his letter, saying that the comment in the copy, quoted above, had been included in good faith. Since receiving his letter they had had further discussions with the supplier of the mould and were now clear that the statement was not accurate. An appropriate correction message is being printed on all despatch notes in respect of all the catalogues offering the mould for sale.

This prompt action on the part of the mail order companies is very welcome. The Society hopes that all manufacturers and suppliers of paper log moulds will in future make it quite clear that the fuel is not suitable for use in smoke control areas, and further, will take steps to apply for authorisation of the fuel so that it can be properly tested.

'ANCIT' PLANT AGREED IN PRINCIPLE

The National Coal Board have decided in principle to build a single-stream ANCIT pilot plant at the site of NSF's Phurnacite plant at Aberaman, South Wales. The Board announced that their wholly-owned subsidiary, National Smokeless Fuels Ltd., will be authorised to proceed with plans to construct the plant, provided that a regional development grant can be obtained and that appropriate financial aid for the project is forthcoming from the European Economic Community.

The decision was announced following a meeting between the Board and the NUM on 3 February. The Board had previously ascertained that the project should qualify for EEC funding, although the EEC could not, in accordance with its rules, put up more than 40% of the £8m required. An application for the funds has been made.

The projected plant would have a production capacity of 85,000 tonnes a year and would use services common to the Phurnacite plant. It would be operated as a pilot plant, to test the effectiveness and suitability of the ANCIT process at the site; Welsh coals have already been tested on the Alsdorf, West Germany, ANCIT plant, and results have been entirely satisfactory. The briquettes were brought back to Britain and found to perform well in domestic solid fuel appliances. ANCIT briquettes will be a premium smokeless fuel suitable for domestic roomheaters as well as boilers.

In the opinion of National Smokeless Fuels Ltd's management, ANCIT is a technically sound and thoroughly proved process (the West German plant has been operating successfully for 12 years) which offers excellent commercial opportunities in the domestic market.

The NSCA, particularly its South and Mid Wales Division, has campaigned since 1980 for the introduction of the ANCIT process at the Phurnacite plant. Speaking at the Bournemouth Clean Air Conference, Maldwyn Jones of Cynon Valley BC described in vivid terms the conditions that people living in the vicinity of the plant had had to endure for many years. The NSCA (see *Clean Air* Vol. 11, No. 1, pp 16-17) and, separately, the NUM and the NCB, made no headway with appeals to the Government for funds. The Society's Welsh Division subsequently suggested approaching the EEC for the necessary finance.

Meanwhile, National Smokeless Fuels have spent £3 million of a total £4 million commitment to a 14 point programme of anti-pollution measures at the plant. A twist to that tale occurred in October 1982, when an industrial tribunal overruled an improvement notice served on the Phurnacite plant by the Alkali Inspectorate (now the Industrial Air Pollution Inspectorate) because implementation of the main requirement would involve NSF in a breach of a national labour agreement which could not be broken or modified by negotiation (see *ENDS Report* 93, October 1982).

LIBERALS PROPOSE DEPARTMENT FOR THE ENVIRONMENT

The Liberal Party Council has pledged that an Alliance government would give environmental improvement priority in its programme, and has called for the establishment of a Minister of State for Environment Protection within the Department of the Environment. The Environmental Protection Department would oversee the statutory and consultative functions in respect of environmental management performed by the various bodies involved.

John Bates, Joint Chairman of the Liberal Environment Panel, said that a supervisory, rather than an executive, authority was proposed, to secure maximum environmental improvement with the minimum of increased bureaucracy. A Regional Inspectorate, paralleling environmental health officers but at a regional level, would be established to be the eyes and ears of the Department. The Regional Inspectors would be empowered to:— oversee all matters affecting the environment (regardless of other Department's responsibilities) call for reports, demand information, and have power to prosecute offenders under existing statutory legislation.

A Parliamentary Select Committee for Environmental Protection would be set up to keep under regular review the need for new legislation to protect the environment, and resolve anomalies in the existing law; public bodies and individuals would be encouraged to participate in the working of the Committee. 'Recognised environmental organisations' would be granted right of access to information and data gathered for both Environmental Impact Statements and Environmental Audits.

The Wildlife and Countryside Act would be amended and adequate funding of those provisions that protect areas of Special Scientific Interest would be assured.

DUST FROM PORTABLE GRINDING MACHINES

A guidance booklet on the control of exposure to dust from portable grinding machines has been published by the Health and Safety Executive. The booklet, which replaces an earlier Code of Practice, is designed to assist employers, safety representatives, supervisors and employees in the prevention of ill health caused by exposure to dust and fume arising from the use of portable grinding machines.

Health and Safety series booklet HS(G) 18 Portable Grinding Machines: Control of dust. HM Stationery Office price £3.00 plus postage, or from booksellers. ISBN 0 11 883670 6.

THE RELATIONSHIP BETWEEN SCIENCE AND POLICY MAKING: THE CASE OF LEAD

by

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This paper was read at the Royal Institution, 21 Albemarle Street, London W1, on March 2nd 1983, to mark the publication of the Proceedings of the International Symposium organised by the CLEAR Charitable Trust (Clean Air Vol. 12, No. 2 pp 63 – 68 refers).

The occasion for this lecture is provided by the publication of the book *Lead Versus Health*,¹ based on the CLEAR symposium held some ten months ago. For the most part, that volume is concerned with the scientific appraisal of the best evidence available at that time on the sources of lead in the environment and on their effects on the health of children. Policy implications are mentioned in passing at various points but they did not constitute the focus of the meeting or the book and, indeed, were excluded from discussion so far as possible. Nevertheless, as the symposium was organised by people campaigning for the removal of lead from petrol, we may presume that it was thought that a public discussion of the research findings was likely to aid their campaign. That presumption raises the question of the relationship between science and policy. As that relationship is often misunderstood, it seemed appropriate that I take it as the topic of my talk tonight. The issues that I shall discuss are general, but I shall take the case of lead as the main example used to highlight those issues.

Sometimes it has been argued that research and policy making are such very different fields of action that it would be better to keep them entirely separate. The game of science is said to be the determination of value-neutral facts, whereas the game of politics involves the design of value-expressive action.² There is some substance in that distinction, but the definitions of both science and politics are much too narrow. Certainly, public policies have to start with a set of values but politicians are in business to implement policies that will express those values, and that will bring about the desired ends. That is to say, the politician has to be concerned with 'what works'. Necessarily, that requires some understanding of processes and mechanisms if the interventions are to be well designed to have the optimal impact. It would be a very foolish politician indeed who was not concerned with the factual evidence on what actions are most likely to be effective in meeting his or her value determined aims.

The belief that science comprises just the accumulation of objective, carefully verified, facts is widely held by laymen, but still it is a mistaken view. I can do no better than quote from Sir Peter Medawar's explanation of science.³ He says:

"Imaginativeness and a critical temper are both necessary at all times, but neither is sufficient Like other exploratory processes, [the scientific

method] *can be resolved into a dialogue between fact and fantasy, the actual and the possible; between what could be true and what is in fact the case. The purpose of scientific enquiry is not to compile an inventory of factual information, nor to build up a totalitarian picture of natural laws We should think of it rather as a logically articulated structure of justifiable beliefs about nature. It begins as a story about a Possible World — a story which we invent and criticise and modify as we go along, so that it ends by being, as nearly as we can make it, a story about real life”.*

It is clear then that science *uses*, and is in business to obtain, empirical findings — objective facts, if you like. If based on sound research such findings *have* to be accepted as ‘true’, at least for the social and biological context in which they were obtained. But, facts are not the essence of science. Rather, that essence lies in the inferences based on the findings — inferences that tell a possible story about the meaning of the findings. This process relies on the creative imagination of the scientist and because, necessarily, that involves speculation and theory, the story is open to argument and dispute. The special characteristic of science is that it is built upon the premise that it is essential to find methods by which the inferences can be checked and tested, so that the merits of one explanation can be systematically evaluated against those of another. However, it is here that science and policy come together. Both have to be concerned to create the right ‘story’. But, therein lies the first difficulty. We have to ask what the story is about — that is, what purpose or process or outcome it seeks to explain. That is where the values have to be made explicit if there are not to be serious misunderstandings between scientists and policy makers. All too often it is evident that they are concerned with different purposes. For example, much educational research has been concerned with the types of schooling most likely to lead to high scholastic attainments, but much of the political debate on the left has been concerned with the policies needed to bring about social equity and on the right with the policies needed to foster self-reliance. Both are reasonable aims, but they reflect quite different sets of values and the scientific findings on high attainments may have little relevance to the aims of either social equity or self-reliance. Not only is it necessary that politicians pay attention to the evidence on the effects of their policies, but equally it is essential that researchers recognise that their enterprise is far from value-neutral. Social values are inextricably tied into the business of determining the questions to be investigated.

The Values Associated with Concerns Over Lead

Let me now turn to the case of lead in order to see whether that involves any clashes on values. For the most part it does not, at least not to a very serious extent, and in that respect the issues are more straightforward than is often the case. For most people the value is simply the promotion of healthy development in children or, more specifically, the concern to prevent possible adverse effects on development stemming from lead in the environment. That aim would be universally accepted and involves no controversy as such. Moreover, the scientific question that arises out of the concern appears quite simple — namely, does lead have ill-effects on health and development and, if it does, at what levels of lead exposure do they arise? Of course, it would be wrong to suppose that that is all there is to it. As in all situations of this kind, it is necessary to go on to

examine the cost-benefits involved. In other words, we have to consider the two types of consequences associated with actions to reduce lead in the environment. On the one hand, we have to ask *how much* difference it will make to the health of children; and, on the other, we have to ask what will be the *costs* involved in terms of finance, resources, and possible alternative hazards to health. At that point, the policy maker has to consider whether there will be disadvantages for health that may outweigh the advantages, and also where the health of children stands in his list of priorities when set against other policy concerns. I will return to those issues presently but first I should pause for a moment to consider one other possible set of values sometimes expressed in relation to lead.

Some writers have made much of the fact that recent research findings from Patterson⁴ and others strongly suggest that the level of lead in the environment today is many, many times higher than that prevailing in the pre-industrial world. It is argued that the relatively high lead levels found in the world as we know it derive from industrial pollution of the environment. That is important for other reasons, but in addition sometimes it is suggested that it is "unnatural" and, because "unnatural", therefore bad. The value here is that the best environment is the one that is most "natural". That sounds reasonable at first sight but it is not self-evidently so. In the first place, it is unwarranted to deduce statements of value from statements of fact — or as philosophers put it: 'ought' cannot be derived from 'is'. In other words, the fact that a state of affairs exists in nature is no basis for assuming that it is desirable for it to be so. In the second place, there is no satisfactory way of deciding what is "natural". It is usually argued that what is "natural" is that which is the product of the inherent nature of living organisms, without outside interference. But the exercise of what is "natural" causes interference. Human nature involves the use of tools; the result of that use may be industrial pollution, so that too is the result of "nature". Or is it? If not, why not? Thirdly, even a moment's passing consideration indicates that what is "natural" may not be good for health. Primitive societies may appear more "natural", but their infantile mortality is far above ours and their life expectancy far less. To a considerable extent, the appalling air pollution that London suffered up to the early 1960s was a consequence of the burning of "natural" fuels in open fires. The legally enforced move to less natural forms of energy has had substantial benefits for both the aesthetics of the environment and for the health of the people living in it. Lastly, our well-intentioned efforts to "conserve" the natural environment may so upset the natural ecology that it damages it. For example, the prevention of forest fires in California has had the unexpected side-effect of preventing the growth of new trees. It seems that the giant redwoods 'needed' fires from time to time to clear the undergrowth and create the right soil conditions for new trees to become established. As Janet Radcliffe Richards⁵ concluded in a penetrating discussion of the dangers of arguing that what is "natural" must be good (albeit in a context far removed from lead):

"This sort of arguing from the natural is an unmitigated menace. If the people who use the arguments come to the right conclusions, it is entirely by accident and for the wrong reasons When people claim that they want something because it is natural we can ignore that issue altogether and concentrate on the manageable questions of what they want to achieve (it may not be something we want at all) and why they think that the method they propose will lead to it."

Do not misunderstand me. I am not, of course, suggesting that efforts to protect our environment from the ravages of industry or tourism or plain neglect are wrong. To the contrary, such efforts are greatly needed and most worthwhile. But what I am suggesting is that these endeavours need to be judged in terms of their specific goals and effects. The appeal to what is "natural" may be well-intentioned but it is a terrible source of muddled thinking and muddled action. I propose to jettison that value with respect to lead and will not consider it further. Accordingly, we are left with the value that all of us would accept — namely, that we should ensure that industrial processes do not have adverse effects on the health and development of children (or, of course, on the health of adults).

The Growth of Concern Over the Adverse Effects of Lead

Before turning to the scientific evidence relevant to that issue, let me briefly set the scene through a consideration of the historical context.⁶ The use of lead in various forms of manufacturing began several thousand years ago and even at that time there was some limited awareness of lead's toxicity. This awareness came more to the fore during the eighteenth century but it was not until the turn of this century that the pathology of lead poisoning became established. In a paper published nearly 70 years ago, Thomas and Blackfan showed that lead was a neurotoxin and that lead poisoning could cause encephalopathy, with convulsions and coma followed by death. They also found that many children who recovered from encephalopathy were left with permanent neurological and psychological impairments — a finding confirmed by later studies. Some 40 years later, around the time of the Second World War, there began to be reports that there could be persistent neurotoxic impairment following milder episodes of lead poisoning that fall short of overt encephalopathy. However, until the 1970s most people assumed that increased lead levels were of little clinical importance if there were no recognisable symptoms of poisoning (in terms of anaemia, peripheral neuropathy, kidney damage, or neurological dysfunction) and if blood lead levels were below 50 or 60 $\mu\text{g}/\text{dl}$. During the '70s that assumption was called in question increasingly, and it was argued that there might be adverse effects of lead on behaviour and intelligence even at levels hitherto regarded as safe or acceptable.

Up to the time of the Lawther report, however, there was little evidence on the effects of lead at the levels now found in the general population of this country. Moreover, even at higher levels the evidence was somewhat inconsistent and inconclusive. Thus, when I reviewed the findings three years ago⁷ I concluded that blood lead levels persistently raised above 60 $\mu\text{g}/\text{dl}$ were associated with an average reduction of some 3 to 4 points of IQ. It seemed likely, but less certain, that there might be adverse effects in the 40 to 60 $\mu\text{g}/\text{dl}$ range. There were some suggestions of possible psychological risks with lead levels below 40 $\mu\text{g}/\text{dl}$ but the evidence was far too scanty for any firm conclusions.

Since then much better evidence has become available. In evaluating that evidence, we need to be clear about the research issues and problems that arose from the earlier investigations.⁸ Let me pinpoint just six. First, as I have indicated, there was a need for study of the consequences of blood lead levels below 35 $\mu\text{g}/\text{dl}$, because very few children nowadays (at least in the UK) have levels above 35 in the absence of personal exposure to special hazards. Secondly, there was a need for epidemiological studies of the general population in view of the many possible biases associated with the use of volunteer

samples or clinic patients. Thirdly, because the effects of lead were known to be small it was essential to examine large numbers of children. Fourthly, it was necessary to use sensitive and well tested measures of behaviour and intelligence. Fifthly, it was crucial to have an adequate assessment of the body burden of lead. For a variety of reasons, it was thought that the measurement of lead in teeth might constitute the most satisfactory index. Subsequent work has confirmed that indeed the use of teeth has many advantages, although also it has become clear that there are more limitations than thought at first. Finally, and in many respects most important of all, it was essential to introduce adequate statistical controls for the effects of possible confounding variables.

Because this last issue is of such fundamental importance it warrants some discussion. Unfortunately, some individuals campaigning for a lead-free environment have tended to see the use of multivariate statistical analyses to take account of possible confounding variables as politically motivated attempts to “explain away” a real effect. However, it is nothing of the kind and that dismissive view involves a serious misunderstanding of what is involved. The whole of epidemiological and clinical research is bedevilled by the need to differentiate between correlation and causation. It is a very common occurrence to find that an association between two variables is no more than an artefact resulting from the connection of both variables with some third variable. In the book *Lead Versus Health*¹ I give the example of height and baldness. It is obvious if you look about you that tall people are more likely to be bald than are short people but that is not because tallness causes you to lose your hair. It is simply a consequence of the fact that adults are taller than children and men taller than women — the real causal variable is to be found in factors associated with male hormones.

It is crucial to appreciate that this sort of problem is a real and practical one with respect to lead and not just a far fetched theoretical nicety. The essential point is that lead is not randomly distributed throughout the population. Children who live in socially disadvantaged circumstances tend to be more exposed to lead and this is reflected in quite substantial differences in blood lead levels between socio-economic groups. The relevance of that fact is that social disadvantage is known to be associated with impairments in children’s intelligence. Moreover, it is clear that this association is *not* explicable in terms of any lead effect. It follows that some of the apparent association between lead and intelligence is likely to be a function of social disadvantage and not anything directly to do with lead at all. The key issue is the need to find out *how much* of the apparent lead effect is real (i.e. caused by lead exposure) and how much an artefactual consequence of the prior association with social disadvantage.

Effects of Lead on Intelligence and Behaviour

I need to turn now to the central question underlying the campaign to get lead out of petrol — namely, whether or not ordinary levels of lead exposure have deleterious effects on children’s intelligence and behaviour. Putting the problem in context it may be restated as follows: As lead is a known neurotoxin and as it is certain that high dosage causes serious brain damage, may lower levels of lead exposure cause lesser degrees of damage, with milder or more subtle effects on neuropsychological functioning? As the book *Lead Versus Health*¹ describes, there is now a substantial body of evidence on this matter. I will make no attempt here to summarise the findings from those earlier investigations. Instead, let me focus on the results of the one major study that has been

reported since the book went to press — namely, the large scale epidemiological study undertaken by the teams from Southampton and the London Institute of Child Health, the findings of which Marjorie Smith⁹ described at a scientific meeting in January. My reasons for concentrating on this study are three-fold. First, it is the most extensive and most thorough piece of research available to date; hence, it is mandatory to pay careful attention to its findings. Second, because also it is the newest of the reports it provides the opportunity to check whether the findings confirm or refute the conclusions drawn at the CLEAR symposium 10 months ago. Third, it provides a particularly good example of the difficulties that are inherent in the scientific problem.

The design of the research was broadly similar to the earlier epidemiological studies of Needleman in the United States and of Winneke in Germany. Accordingly, the results of these three studies must be compared and contrasted. The British study, like its predecessors, concerned ordinary children in the general population, who were asked to donate any teeth that they lost naturally. The children were aged 6 to 7 years, as that is the peak time for the loss of milk teeth. The teeth were then analysed for lead content. The main comparisons concerned three groups of children — about 150 with 'high' lead levels, a similar number with 'low' levels, and about a 100 with 'intermediate' levels. The blood lead level equivalent for the 'high' group was $14\frac{1}{2}$ $\mu\text{g}/\text{dl}$ and for the 'low' group it was $11\frac{1}{2}$ — in other words, the study dealt with relatively low levels even in the 'high' groups; moreover, the range of levels was quite narrow.

I won't describe the methodology other than to say the attention to detail was exemplary. The cooperation rate was very high, great care was taken with all aspects of measurement, and there was a particularly thorough examination of possible confounding variables. These included the mother's IQ, the education of both parents, the family's social background, and various aspects of parental interest in the child. The results showed that there was an initial IQ difference of some 5 points between the 'high' and 'low' lead groups — a difference that was statistically significant. After correction for confounding variables, the difference fell to just over $2\frac{1}{2}$ points, a difference that was no longer statistically significant. Of course, there were many more findings than this, but these IQ results serve to illustrate the dilemmas involved in drawing conclusions. As I have noted, the corrected figures for IQ failed to show a significant difference between the various lead groups. If a difference falls short of statistical significance that means that it might have arisen by chance; hence, the standard convention in science is to presume that it *was* due to chance unless there are strong reasons for thinking otherwise. But it is important to appreciate that this convention applies only *within* a single investigation. In this case we have many other studies and those must be taken into account when drawing conclusions.

For the purposes of this discussion, let me focus only on the few epidemiological studies that have used teeth as an index of lead exposure.¹⁰ The Needleman study found an IQ difference of about $6\frac{1}{2}$ points before correction, which reduced to $4\frac{1}{2}$ points after correction. Winneke's study in Stolberg produced very comparable figures — namely $7\frac{1}{2}$ points before and $4\frac{1}{2}$ points after correction. Winneke's study in Duisberg involved matched groups so that there was no further correction for confounding variables; the high-low lead group difference was about 7 points. It is obvious that the findings of these studies undertaken in three different countries are remarkably similar. That is to say,

they showed that the initial difference in IQ between 'high' and 'low' lead groups was of the order of 5 to 7 points; after correction it was of the order of 2½ to 4½ points.

Let us now consider the inferences to be drawn from these findings. Basically, there are three main hypotheses that warrant serious attention: 1) that the results were due to chance; 2) that the small IQ difference remaining after correction for confounding variables was, in reality, the result of other social (or genetic) variables not included in the analyses; and 3) that there is a small, but real, deleterious effect of lead on intelligence.

The first hypothesis can be ruled out fairly firmly. If the results were due to chance they should favour the high lead group about half the time and the low lead group about half. But that isn't what has been found. In virtually all cases where there has been a difference it has favoured the low lead group. This could happen only if there was a systematic tendency for studies with non-significant differences in the reverse direction not to be published. In other circumstances that constitutes a real possibility but it is most unlikely that this has occurred with lead research. There are powerful lobbies on both sides only too willing to promulgate research of any quality that supports their case; it is highly improbable that any significant research remains unknown. Accordingly, we may rule out the 'chance' hypothesis.

The second, 'uncontrolled variables', hypothesis requires more serious consideration. The hypothesis argues that even with multiple covariates inevitably there are other variables not included in the analysis and that, as those that were employed substantially reduced the apparent lead effect, it is likely that if *all* relevant variables could be taken into account the remaining IQ difference between lead groups would disappear entirely. It must be admitted straightaway that that is a possibility, if only because it is *never* practicable to take all possible variables into account. However, there are various means by which we may assess the likelihood that this has happened. There are a host of relevant technical issues that need to be evaluated but, in essence, the problem boils down to two basic questions. First, is it more likely that there has been *under*-correction or *over*-correction for confounding variables? Second, does the available evidence suggest that the variables not included in the analysis could have had a greater effect than those that were included?

It is not possible to give a firm and confident answer to the first question and it has to be said that opinions differ on this matter. However, it is generally held that when *many* confounding variables are entered into the analysis, over-correction is more likely than under-correction (the reverse applies when only a single covariate is employed). Also, the usual convention in multivariate analyses is to attribute the *whole* of the shared variance to the confounding variable. In other words, it is assumed that when the effects of social disadvantage and lead overlap, all of the overlap is due to social disadvantage. That constitutes a harsh test, albeit a safe one if falsely positive conclusions are to be avoided, and it may not represent the true state of affairs in the real world. In my judgement, the chances of over-correction are as great as those of under-correction; probably the truth is that the degree of correction is approximately right.

The second question starts with the observation that in all these epidemiological studies, the correction for many confounding variables has never removed as much as half of the lead effect on IQ. Accordingly, we need to look at other research to consider whether it

is plausible that the unmeasured variables could be *more* powerful than those included in the analyses. The evidence is quite consistent in showing that other social variables do *not* have any appreciable additional effect, let alone one that could be *greater* than those already included in the analyses.⁸ I conclude that it is most *unlikely* that the remaining lead effect of 2 to 4 points could be reduced to zero.

What then about the third hypothesis that there is a small, but real, adverse effect of lead on children's intelligence? That hypothesis has four main legs of support. First, as already discussed, almost all of the best studies have ended up by showing *some* difference between high and low lead groups, even when other influences have been taken into account. Second, within each of these studies, there has tended to be a consistent 'dose-response' relationship — that is, the group intermediate in lead levels has usually also been intermediate in IQ. Third, neurophysiological studies have shown similar differences between high and low lead groups. Finally, animal studies have shown that ordinary levels of lead exposure have measurable biological effects. The point of the last two legs of the argument is their demonstration that lead has an effect on body systems even at quite ordinary levels of exposure. We do not know whether these effects 'matter'; that is to say, the demonstration of some chemical or physiological difference does not necessarily imply that the difference is damaging to function. It has to be admitted that that link remains most uncertain. Also, of course, there are further uncertainties extrapolating from animal experiments to the human situation. Nevertheless, the findings are important in terms of their suggestion of possible biological mechanisms for the neuropsychological effects.

Both the human and the animal evidence suggests that levels of lead as low as 30 $\mu\text{g}/\text{dl}$, and possibly lower than that, can interfere with a variety of biochemical and neurophysiological functions. Furthermore, there is no indication of any definite threshold below which lead has no effect. We may conclude that there are biological processes by which relatively low level lead exposure *might* lead to psychological impairment (although by the same token, it has to be added that the biological changes are not such as to lead to any necessary expectation that there *should* be psychological effects).

Does all of this amount to scientific *proof* that ordinary levels of lead are damaging to health? No, it does not. There are too many 'ifs' and 'buts' to come to an entirely definite conclusion on the neuropsychological effects of ordinary levels of lead exposure. However, the quality of the research during the last few years represents a major advance on that available earlier. It does not remove all doubt but it goes a long way towards that end. In my view, the hypothesis that lead *does* have an effect is substantially more likely than the hypothesis that it does not.

So where does that leave the scientific issues? The first query is whether further epidemiological research is needed in order to remove all doubts. In my view, it is not, for two rather different reasons. First, the studies undertaken in the last few years do not have any major methodological shortcomings that need to be remedied. They are not perfect but they are good enough. Second, the nature of the problems involved in causal inferences are not of a kind that are likely to be resolved by further epidemiological research. For better or worse, we must take decisions on the basis of the evidence available now.

However, that does not mean that there are no further issues that require study. There are several, but let me mention just four. First, in spite of the apparently strong findings

in the studies by Needleman and by Lansdown and Yule, no conclusions are yet possible regarding the effects of lead on behaviour. That is because the findings from other investigations are contradictory, with some finding an effect, but others not. It would be premature to rule out the possibility of an effect, but equally there are no strong grounds for inferring one. The real doubts about the reality of effects of lead on behaviour require that the matter be investigated further.

Second, we are not in a position to evaluate the benefits of chelation (i.e. chemical removal of lead from the body) in relation to ordinary levels of lead exposure. Oliver David's studies suggest that there *may* be benefits but there are doubts because a) there are difficulties in his research design; b) the apparent effects apply to behaviour rather than to intelligence and, as we have seen, the epidemiological data are inconclusive on whether or not lead affects behaviour; and c) the findings have not yet been confirmed or refuted by other investigators.

Third, some of the research raises the possibility that the true causal effect of lead on intellectual functioning may largely apply within socially disadvantaged sections of the community. The evidence on this point is both meagre and inconclusive but several studies have findings that suggest that the effect may be minimal in children from more advantaged homes. That the possibility is an important one is indicated by the finding of just such a biological-social interaction with respect to perinatal complications and malnutrition — two other physical hazards that may impair brain functioning. The matter warrants further study.

Fourth, we remain ignorant about the biological mechanisms that mediate the apparent lead effect on neuropsychological functioning. Often it is supposed that the effects stem from small amounts of brain damage but, although that is possible, it is by no means probable. The neuropsychological findings in humans provide no basis for inferring mechanisms and, in particular, they do not necessarily indicate any form of structural damage to the brain. Perhaps the most important feature of the experimental research in animals is their demonstration that *different* biochemical effects arise at different levels of body lead. The implication is that the biological effects at low lead levels *may not be the same* as those at high levels. The demonstration that high doses of lead cause major brain damage does not mean that lower doses cause minor brain damage. The fact of the matter is that we do not know what functional consequences stem from each of the biological effects that have been demonstrated. Again, the resolution of that issue requires further (and different) research.

So much for the scientific issues with respect to the effects of ordinary levels of lead exposure. I have discussed them at some length here because a few of the more enthusiastic individuals involved in campaigning seem to imply that we have already got all the answers. We have not, and it is scientifically mischievous and misleading to claim that we have.

Policy Implications of the Findings on Lead Effects

Nevertheless, there is quite a lot that we do know and it is necessary that we act in the light of that knowledge, even if it is far from complete. A rather different set of issues arises in this connection. The first question is whether there is a need to take any decision. Some scientists and politicians are inclined to take the line that, as there is

scientific uncertainty on whether or not there is any significant effect of lead at ordinary levels of exposure, we should do nothing. That sounds plausible at first sight — after all, why should we upset the status quo if the scientific evidence is not certain? However, the argument is seriously flawed, as is apparent as soon as we examine its premises. Let me note just three features. First, it assumes that it is possible to have no decision on what policy to follow. Clearly, that is not so. No decision to act is the same as the decision not to act. Second, it assumes that science commonly leads to certainty. It does not. Ordinarily, research results in statements of probability with respect to policy implications. The real issue is what *level* of probability you demand before actions are taken. Third, and most important of all, it assumes that the onus of proof lies on those who argue for change rather than on those who argue for maintenance of the status quo. That might be an acceptable argument if the status quo had been established on the basis of a large body of well conducted research; in that circumstance one would not overthrow that research on the basis of new studies of uncertain status. But, of course, that is far from the case with respect to lead. Lead was *not* added to petrol after extensive investigations to test for its safety. To the contrary, it was added on the basis of ignorance regarding its effects.

No, the question should not be posed in terms of which side has the onus of proving its case. There are no good grounds for placing that onus in favour of the status quo *or* the proponents of change. Rather, the relevant question concerns the health implications of change versus no-change — in the light of both the possibilities (i.e. that there is not a true lead effect and that there is a true effect). That is a very difficult question with respect to many substances just because mineral elements that are vital to health in low quantities may be toxic in high quantities. However, that is not so with lead. So far as we know, there are absolutely no health benefits from lead at any level, low or high. It is a neurotoxin without any redeeming qualities. Thus, there are no health risks associated with its removal from the environment but there are possible health risks associated with its retention. In short, if environmental lead is kept at present levels there are *no* health benefits but there are risks. Conversely, if environmental lead is reduced there are no risks but there are possible benefits. It is obvious that, if viewed purely in health terms, the risks lie entirely in the maintenance of the status quo. Accordingly, the onus of proof needs to be placed on those who advocate no action, rather than the other way round.

The second major question concerns the *size* of the supposed lead effect. There are many people who would accept all that I have said so far but who would then argue that the effects are too small to be worth bothering about. Really, that involves three rather separate questions: 1) what is the size of the effect; 2) what are the population implications that follow from that size of effect; and 3) what is that worth in your own set of values?

Let me take those one at a time. The first subquestion is easy to answer. *All* the available evidence indicates that the neuropsychological effects of lead within the range seen today in ordinary environments without special high risks are quite small. Of course, there have been claims to the contrary by individual scientists who have got rather carried away in a flush of enthusiasm. Thus, in 1974, it was suggested that muggers, vandals and football hooligans might be appropriately treated by chelation¹¹, and just over two years ago it was argued that the adulteration of petrol by lead is the greatest threat to mankind,

short of all-out nuclear war!¹² We can dispose of claims of that kind quite firmly. If nothing else is known, it *is* known that the effects are nowhere near that range of magnitude. In terms of risks to mankind, lead is far from top of the list. (I should emphasise that these extravagant claims have *not* been made by CLEAR, although they have been made by others).

In population terms, lead accounts for a tiny proportion of the variance in cognitive performance (probably not more than 2 or 3%). Its effect compared with other factors, genetic and environmental, is quite minor. Expressed another way, the usual difference in mean IQ found between high lead and low lead groups has been of the order of 2 to 5 points. What about the argument that this estimate applies to the figures only after correction — is it not possible that over-correction has occurred and that the real effect is greater? Yes, that is possible but it does not alter the argument. The point is that the uncorrected effect is only some 4 to 7 points. As that is bound to be an over-estimate to some degree, it is clear that even on the most generous assessment the effects of ordinary levels of lead on intelligence are small when compared with other variables.

The second question asks whether these few points of IQ matter in terms of their population implications. Some people have argued that they do not, on the grounds that such a small effect is less than the usual amount of change from one IQ test to the next and, moreover, that such a trivial shift in IQ could not possibly have functional implications. That argument, however, is false for three different reasons. First, it is not sensible to equate changes of IQ in an individual child with changes of IQ in the population as a whole — the two figures have a quite different meaning. Second, the figure of 2 to 5 IQ points represents an *average* effect. Individual differences in susceptibility will mean that in some children the effects of lead will be less than that, and in some they will be more. For example, probably the effects are greater in the very young, in the malnourished, and in the socially disadvantaged. It is crucial to take these individual differences into account — it is not sensible to plan only for some hypothetical 'Mr. Average' and certainly not acceptable to plan only on the basis of the socially privileged who may not be at risk. Third, it is necessary to appreciate that a difference of just 5 points in the group-means implies a much greater difference at the extremes. Indeed, if one assumes that lead results in no change in the distribution of IQ (but just an overall shift to the left in the curve) a difference of 5 points means a doubling in the number of children with an IQ below 70. That expectation is based on statistical assumptions but Needleman's data indicate that within his sample the effect occurred in practice. Thus, we may conclude that ordinary levels of lead exposure have only a minor effect on cognitive functioning, that the removal of lead from the environment would make little difference to the intelligence of the general population, but that even that minor effect is sufficient to be of importance from the viewpoint of both the individual and the policy maker.

The third question I posed was what was that small effect on health worth in terms of your own set of values? Clearly, that is a matter for each of us to decide as individuals, but my answer is that any improvements in the health of children must be judged worthwhile. Of course, whether actions to bring about small improvements in health are justified must depend on the costs involved. So let me turn now to the other major issue of policy concern — namely, where does the lead come from? Clearly, the answer to that question will determine which policy actions are needed to reduce the level of lead in the environment.

Sources of Lead in the Environment

I will deal with the subject of sources of lead in the environment more briefly, if only because it is less within my own area of expertise than the topic of lead effects. Nevertheless, it demands some careful consideration in any discussion of the relationship between science and policy. Most of the controversy has centred on the contribution of the lead in petrol. As you will recall, the Lawther Committee¹³ concluded that in the population as a whole, the lead in petrol contributed only about 10 per cent of the body burden of lead — although, also, it emphasised that in certain ‘hot spots’ with particularly high levels of air lead, petrol might constitute the major source of uptake. The report’s estimate of 10 per cent was much criticised at the time and subsequent research has shown that it was far too low. I will come to the nature of that new evidence in a moment but perhaps I should pause first to consider why the estimate was as far out as now seems to be the case. As a signatory of the report, it is natural that I should have given some thought to that question. Of course, it is not difficult to defend the report’s conclusions on the twin grounds that the best evidence on the matter has become available only since the report was published and that even today the precise level of the contribution from petrol remains quite uncertain. Both grounds are valid but still we should ask whether there are lessons to be learned. Looking back with the advantage of hindsight, I would single out four features of relevance. First, as scientists, we are trained to recognise the limits of our own expertise. Most scientists, quite properly, are very reluctant to speak as experts on topics outside their own area. The result in these circumstances, however, was an unfortunate tendency for all of us to stick too closely to our own particular field of knowledge. Second, we lacked the breadth of scientific backup we needed when dealing with such a complicated set of questions. Since the Lawther Committee, I have had some opportunity to see how the United States has tackled the same topic through the work of their Environmental Protection Agency — an independent body of scientists who undertake research and research evaluation as a service to Government (but not as spokesmen for Government). We have no equivalent organization and there is no question but that the type of expertise provided by the EPA was not available to us. Maybe it should be in the future. Third, the ways in which some scientists, who ally themselves to political campaigns, act serves to diminish their influence. In this connection I mean both campaigns to keep lead in petrol and those to get it out. All too often, they discredit themselves by engaging in character assassination of those who disagree with them, by obviously unwarranted overstatement of the scientific inferences or of the policy implications, and by their transparent acceptance of bad research when it happens to suit their case. As a result, their extravagant arguments are rightly dismissed as pamphleteering rather than scientific contributions to be taken seriously. However, on occasions, their diatribes contain an important nugget of truth that is in danger of being overlooked. Fourth, I think that we posed the wrong questions. There was a tendency to ask about the contribution of each source (a topic on which the evidence was wholly inadequate for the task), rather than attempt to consider the broader question of just where all the lead came from. Thus, the Lawther Committee quite rightly concluded that in the cities some 45 per cent to 90 per cent of blood lead came from food. It went on to note that little lead was taken up by plants from soil (again something confirmed by subsequent research). What we did not do is adequately

appreciate that that posed a major question of where on earth the lead in food did come from (it had already been established that most of the lead in food derived from plants). If we had done so, I have no doubt that our conclusions would have been rather different. The result is that most of the factual findings in the Lawther report have stood the test of time, but some of the scientific inferences have not. That difference underlines two of the points made in my introduction — namely, that facts and inferences are not synonymous and that the scientific 'story' told depends heavily on the ways in which the questions are posed.

What then is the new evidence that suggests that petrol contributes substantially more than 10 per cent of the lead in the blood? This is dealt with in some detail in the book *Lead Versus Health*¹ so a very brief summary may suffice here. The evidence is of four different types. First, there is an increasing body of research to show that very young children ingest lead from dust through sucking their fingers and that much lead in dust derives from petrol. Second, a variety of studies have suggested that airborne deposition of lead makes a substantial contribution to the lead in food. The importance of these first two sets of findings lies in their emphasis that the main route by which the lead from petrol enters the body is likely to be ingestion rather than inhalation. The third set of evidence is not concerned with how lead enters the body but rather seeks to estimate its contribution to the body burden of lead through the study of change. The pertinent findings in this connection stem from recent American studies showing clear parallels over the last decade between the timing and extent of the reduction of lead in petrol and the marked drop in blood lead levels in the population as a whole. Statistical modelling shows that the data are consistent with a 46 per cent contribution to blood lead from petrol lead. Lastly, there is evidence from the Italian isotopic lead experiment. Because petrol additives were derived from lead with a known, and different, isotopic ratio it was possible to trace the lead stemming from such additives and hence to determine its relative contribution to the overall lead in both the environment and the body. From these results it was calculated that about 24 per cent of the blood lead in the adult population of Turin came from petrol.

For a variety of reasons, which there is no time to consider here, the available empirical data are not sufficient to permit any quantitative estimate of the contribution of lead in petrol to food, and hence there is no basis for precise estimates of the contribution to the overall body burden of lead. There are too many unknowns and too many untested assumptions for claims on quantification to be credible. On the other hand, there can be no doubt that the Lawther Committee estimate of 10 per cent was much too low.

I have been concentrating on the role of petrol as a source of lead, because that has been the focus of the main controversy. However, I must now put the picture into better perspective. Probably, it is fair to conclude that in the population as a whole in England today, petrol constitutes a major contributor to body lead — perhaps even *the* major contributor, although that is more debatable. Nevertheless, it is clear that any such general statement is bound to be seriously misleading. Any overall estimate crucially depends on the ambient sources of lead and this varies from individual to individual. In some situations, lead smelters constitute a serious health hazard. In others, the children of lead workers gain most of their lead from contaminated clothing brought into the home. For people living in south-west Scotland during the 1970s, in a house with lead

plumbing and soft water, the main source of lead would have been drinking water. For young children with pica living in a house with crumbling lead paint, the ingestion of paint will be the main source.

It should be added that the evidence also suggests that the sources probably vary according to body lead level. Studies of children with moderate or high levels of body lead indicate that in most cases the lead intoxication stems from pica, from cosmetics, or from other 'personalized' sources of lead ingestion or exposure. Petrol probably constitutes but a minor contribution to lead exposure in those circumstances. On the other hand, petrol constitutes a much more major cause of lower level lead exposure, which is only very weakly associated with pica. The implication is that the Lawther Committee were right to argue that, *as well as* progressively taking lead out of petrol, there should be vigorous action to deal with non-airborne sources of lead contamination in the environment. On the other hand, it now seems that they very substantially underestimated the risks from lead in petrol.

Policy Implications with Respect to the Lead in Petrol

That raises the policy issue of whether it is necessary to take further action with respect to lead in petrol. Some people have argued that as the Government is already committed to reduce the lead in petrol to 0.15 g/l, surely that ought to be enough. After all, it has already been noted that the adverse effects of ordinary levels of lead exposure are quite small; will further reductions *really* make any difference to the health of children? How far do we need to go in reducing the lead in the environment? As I comment in *Lead Versus Health*¹, the only honest answer to those questions is that we do not know — in that, still, we are quite unclear on the level of body lead at which risks to health appear.

Owing to an exceptionally unfortunate choice of wording in one sentence, the Lawther report laid itself open to the interpretation that it was known that there were no ill-effects from lead at levels below 35 $\mu\text{g}/\text{dl}$. That would have been scientific nonsense and as the rest of the report makes clear, that was not the view of the Working Party. We observed that, at that time, there was a *lack* of convincing evidence of effects below 35. However, a paucity of evidence on ill-effects (which was the case in 1980) is an entirely different matter from the presence of good evidence that there were no ill-effects (which was not the case). It is most important that scientists be absolutely clear when advising policy-makers that they are explicit on the distinction between 'we do not know if X is the case' and 'we know that X is not the case'. It is equally crucial for policy makers to appreciate that that distinction is fundamental. The last three years have seen a fair degree of muddledom on that vital point.

Research during the last few years has shown that the blood lead level of 35 $\mu\text{g}/\text{dl}$ does not constitute a safety limit. Nevertheless, it could be that there is such a limit at some (as yet unknown) lower level. While it would not be justified to rule out the possibility of a threshold, there is no evidence at the moment that one exists. Accordingly, prudence suggests that it would be unwise to act on the assumption that blood lead levels are now at a level below such a hypothetical safety limit.

Indeed, three sets of findings indicate that it could be dangerous. First, the epidemiological studies already considered have shown apparent lead effects at ordinary levels of current exposure. Second, animal studies and neurophysiological investigations in

humans have suggested that there may be biological effects at these same levels. Third, as already noted, there is considerable individual variation in susceptibility to lead. One person's safety limit is another person's danger zone.

Thus, we may conclude, as before, that the health benefits of a further reduction of lead levels remain uncertain but also that there are no health benefits from maintaining present levels. What about the non-health costs of removing lead from the environment — and in particular of prohibiting the addition of lead to petrol? I am no industrial economist and I shall make no attempt to put a figure on the cost. However, it is clear from all estimates that the costs are quite low — perhaps a few pence per gallon of petrol and some temporary inconvenience to the motor industry. Furthermore, we should note that some other countries have already taken legislative action to prevent the use of lead additives. This action has proved acceptable and not unduly costly. Note that here we do not have to rely on speculative estimates of costs; already experience is available elsewhere. Can we not compromise on a 0.15 g/l limit? Perhaps, but are there any advantages in doing so? Some costs are already involved in that first step of reduction to 0.15 g/l and, moreover, the British car industry is already having to manufacture cars able to take the lead-free petrol in order to meet American import regulations. As there are some possible health risks involved in that compromise and no substantial benefits, that seems to me an unacceptable solution. However, as I have indicated several times, these policy decisions are several steps away from the scientific facts and the scientific inferences. Necessarily, values are involved. Our decisions on whether we think the possible health benefits are worth the minor industrial costs depend on value judgements rather than on science. However, what is important is that we are all clear on the grounds for these decisions and on the cost-benefits involved.

Conclusions

My aim has *not* been to review the scientific evidence on the sources and effects of environmental lead, although I have touched on some aspects of that topic. Rather, I have sought to use the case of lead to illustrate the issues involved in moving from scientific 'facts' to scientific 'inferences' to policy decisions. The process is a complicated one and it allows of no neat conclusions or finite endings. I imagine that it is quite likely that at some time the Government will take the decision to prohibit the use of lead additives for petrol. Personally, I have no doubt that they *should* take that step, in spite of the scientific doubts and the limited health benefits. The point is that we do not need any further research to resolve the policy issues. No good can come from keeping lead in petrol and harm may result. Do we need to know more than that? Nevertheless, even if the Government ban lead from petrol, that will not close the scientific case. As I have noted, several crucial scientific questions remain unresolved. But also it will not bring policy decisions to an end. Other non-petrol sources of lead remain and at some point we will have to decide how much we are prepared to pay to remove them. Also, once lead is taken out of the process of petrol production, we have to remain alert to the possibility that other agents with different health hazards may come to take its place. At that point lead will no longer be in the news but our hope must be that the science-policy relationship will still be alive and active.

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EUROPE TO VOTE ON LEAD FREE PETROL

At their meeting next month, the European Parliament's Environment Committee will debate a proposal to ban the use of lead in petrol. The resolution, drawn up by the committee's chairman, MEP Ken Collins, and vice chairman, Stanley Johnson, MEP, has all party support, and proposes a three-point programme to eliminate lead in petrol throughout the EEC.

The proposals are: for lead free fuel to be made available, for new cars to be manufactured to run on it; at the same time, for all EEC countries to cut the maximum amount of lead allowed in fuel for cars now on the road, to 0.15 grams per litre.

Following debate in the European Parliament (expected in May), draft regulations could be put before member governments later this year.

DIVISIONAL NEWS

NORTHERN DIVISION

Forty-two members attended the Autumn Meeting of the Northern Division held in the Civic Centre, Chester-le-Street on 10th December 1982. After a welcome by Councillor Pratt, Chairman of Chester-le-Street District Council and completion of the usual routine business, members heard a talk from Mr. Arthur Ward, Health Education Officer to the Durham Area Health Authority. In his presentation, Mr. Ward explained the dangers of setting expectations too high when organising any health education campaign and the need to know the community in order to get the message over. A determination not to be sidetracked was essential, he said, together with a clear understanding of what the word health meant to the public. Mr. Ward's talk promoted a vigorous discussion at the end of which he was thanked by Mr. L. Mair, Vice-Chairman.

C.R. Cresswell
Hon. Secretary

Sadly, this is the last report Colin Cresswell will make in *Clean Air* as Hon. Secretary of the Northern Division. After seven years of outstanding contribution to the work of the Division and the Society's national Council, Colin has retired from local government and given up his NSCA appointments. We wish him every success and happiness in retirement.

North West Division

Obituary — John L. Palk

The death of John Palk occurred in hospital on Saturday, 15th January, 1983. John Palk, who was 69, had been admitted to hospital the previous week.

John entered local Government as a student with Ellesmere Port. After war service with the Royal Army Medical Corps in Africa he was appointed as Sanitary Inspector with Church U.D.C. in approximately 1946. He remained with Church until re-organisation when he joined Hyndburn B.C. as head of the Air Pollution and Noise Control Section.

Unfortunately John had to retire early due to ill health in 1978 and in 1979 suffered the sad loss of his wife. He will always be remembered for his intense commitment to his work. In particular air pollution control and housing were his special interests. Under his guidance Church U.D.C. was one of the first Authorities in the North West to complete its smoke control programme.

John's interest in smoke abatement was reflected in his membership of the National Society for Clean Air. He was an enthusiastic member of the North West Divisional Council until his retirement. In addition he was always interested in the Association/Institution of Environmental Health Officers.

INDUSTRIAL NEWS

Vibraject — a New British Liquid Waste Injection Vehicle

Two of Tiverton Ltd have launched their new Vibraject Liquid Waste Injection Vehicle. Vibraject, which has been specifically designed to suit British requirements for large capacity and high injection rates, coupled with extreme manoeuvrability and compact overall dimensions, is offered with alternative Grassland or Arable Injectors.

The Grassland Injector, with its five vibrating tines, injects below ground level, at variable depths, with a minimum of surface disturbance. The Arable Injector is a five tine unit, designed for injecting into arable land at independently variable depths up to 38 cm (15in).



Each system is able to inject liquid waste at rates up to 179 000 litres per hectare (16000 gallons per acre) and the 9100 litre (2000 gallon) tank can be fully charged within a five minute turn-round period.

The injection units are easily interchanged and are mounted on a rear toolbar which is hydraulically operated, for depth and pitch control, from either the driver's cab or a rear workstation.

Reader Enquiry Service No. 834

Dry Fog suppresses fugitive coal dust

A new dust suppression system that knocks down fugitive coal dust without wetting the coal and impairing its heating value is proving highly successful.

Called "Dry Fog" dust suppression, the system sprays a fine "fog" of micron-size water droplets directly over dust generation points. Keeping the coal dry is particularly important in a coal handling operation since any residual moisture on the coal impairs boiler performance.

The tiny droplets produced by Dry Fog are just of sufficient size to collide with the fugitive coal particles and create agglomeration so the coal dust falls down on its own accord. In fact the droplets are so small they evaporate after triggering agglomeration. For every gallon of water used, Dry Fog puts out many thousands of very tiny droplets producing very effective suppression.

Typical locations for Dry Fog are inlets and outlets of coal crushers, conveyor belt transfer points and storage bins. Dry Fog systems are less expensive than a baghouse and more effective than conventional wet sprays.

Reader Enquiry Service No. 835

Economical rectangular dust collectors

Dustcheck Ltd, the dust control engineers of Stone in Staffordshire, have introduced a range of rectangular dust collection filters. Six sizes of housing are available offering filtration areas from 10 up to 60m² in size.

These supplement an existing range of circular units, but show cost savings of up to 10% for the larger sizes. The new collectors utilise the well established Purolator* large area micronic filter cartridges and are compatible with all general industrial dust control requirements, with venting varieties also available for silo applications. These new Dustcheck rectangular filters are claimed to utilise considerably less floor area than other competitive units and are supplied complete with integral fan, collection hopper and an automatic mechanical shake cleaning system. Optional extras include acoustic hoods and explosion relief panels, together with weathercowls and shaker controls for the silo varieties.

The all-steel housings are supplied as standard in a gloss grey, although special finishes and colours can be accommodated. Collector bin capacity is 76 litres and optional 240 or 415V 50Hz motors can be fitted.

* Dustcheck Ltd. are sole UK/Eire agents for the cartridge filter elements manufactured by the industrial division of PUROLATOR GmbH of F.R. of Germany.

Reader Enquiry Service No. 836

Netherlands Steel Works Choose British Coke Oven Gas Cleaning Filters

The Air Pollution Control Division of Tilghman Wheelabrator Ltd has received a £½M order from Hartung Kuhn & Co of Dusseldorf, Germany.

The company is to design, supply, erect and commission a gas cleaning plant to operate in conjunction with a coke oven fume extraction plant which Hartung Kuhn

are supplying to Hoogovens company in the Netherlands.

This very difficult gas cleaning application is understood to be the first of its kind in Europe to incorporate high temperature, high efficiency fabric filters, a technology which has been pioneered by the Wheelabrator-Frye Group in the USA, the parent company of Tilghman Wheelabrator Ltd.

The basic Tilghman Wheelabrator equipment comprises a spark arrestor, six pulse jet filters, inlet and outlet manifolds, fans and outlet stack, but in addition a specialist pre-coating system complete with materials handling and storage is incorporated. This is necessary to protect the filter media from possible contamination from tars which could be present in the high temperature fume.

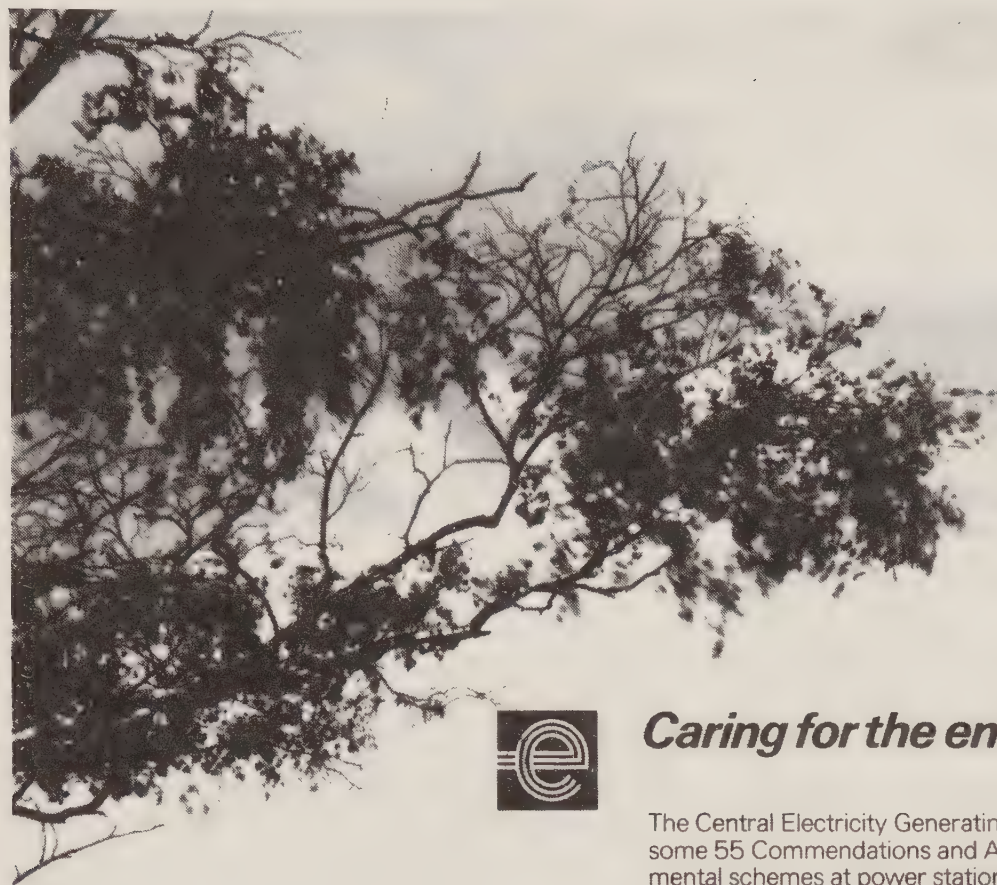
The filters used are the latest Tilghman Wheelabrator Jet III design, which incorporates a special built-in distribution baffle to give a good gas flow around the synthetic fabric filter tubes. With the accent on ease of maintenance, each filter has a high level walk-in weatherproof chamber facilitating clean side access to the filter media and pulse cleaning equipment.

The bags are suspended from the floor of the walk-in chamber which allows easy removal without the use of tools, since a special snap ring spring arrangement is incorporated into the top of the filter bag.

A highly sophisticated PLC system ensures that the filter bags are automatically cleaned and then pre-coated at a preset differential pressure and time linked with the pushing operation.

These filters are being manufactured in the Tilghman Wheelabrator works in Altrincham along with auxiliary equipment from Germany and Holland.

Reader Enquiry Service No. 837



Caring for the environment

The Central Electricity Generating Board has received some 55 Commendations and Awards for environmental schemes at power stations, substations and associated nature trails and field study centres in England and Wales.



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FUTURE EVENTS

CHEMICAL WASTE A one-day Symposium entitled "Chemical Wastes: Disposal or Recovery" is to be held at the University of Leeds on Wednesday 30th March 1983. It is organised by the RSC Central Yorkshire Section and details are available from Dr. D. Toothill, Department of Chemical Pathology, Old Medical School, LEEDS LS2 9NL (Tel: 0532 36171)

INDUSTRY AND THE ENVIRONMENT IN PERSPECTIVE A three day Symposium organised as part of the Annual Chemical Congress, 1983, by the Royal Society of Chemistry. 11 – 13 April, University of Lancaster. Details: Royal Society of Chemistry, 30 Russell Square, London WC1B 5DT. (Tel: 01-631 1355).

4th EUROPEAN CONFERENCE ON ENVIRONMENTAL POLLUTION Intended for all who are interested in any aspect of environmental pollution. Sponsored by the Environmental Pollution Research Institute and Alena Enterprises of Canada. 13 – 14 June, 1983, at the Strand Palace Hotel, London. Details: Dr. Vijay Mohan Bhatnagar, President, Alena Enterprises of Canada, P.O. Box 1779, Cornwall, Ontario K6H 5V7, Canada. (Tel: (613) 932 – 7702).

ENVIRONMENTAL IMPACT ASSESSMENT COURSE 1983 Following its successful courses in 1981 and 1982, Manchester University is again providing a short course on the use of environmental impact assessment in the appraisal of private and public sector projects from 12 – 14 April 1983. The course is intended for managers with environmental responsibilities in industry, land use planners, environmental health officers, water authority officers, managers and researchers in environmental protection. Speakers include Robin Bidwell, Roy Ford, John Handley, Peter Nelson, Norman Lee, Christopher Wood and a representative of the European Commission. The residential cost is £135.00 (VAT exempt). Details from: The Conference Secretary, Department of Town and Country Planning, University of Manchester, Manchester M13 9PL (Tel: 061 273 3333 ext. 3620)

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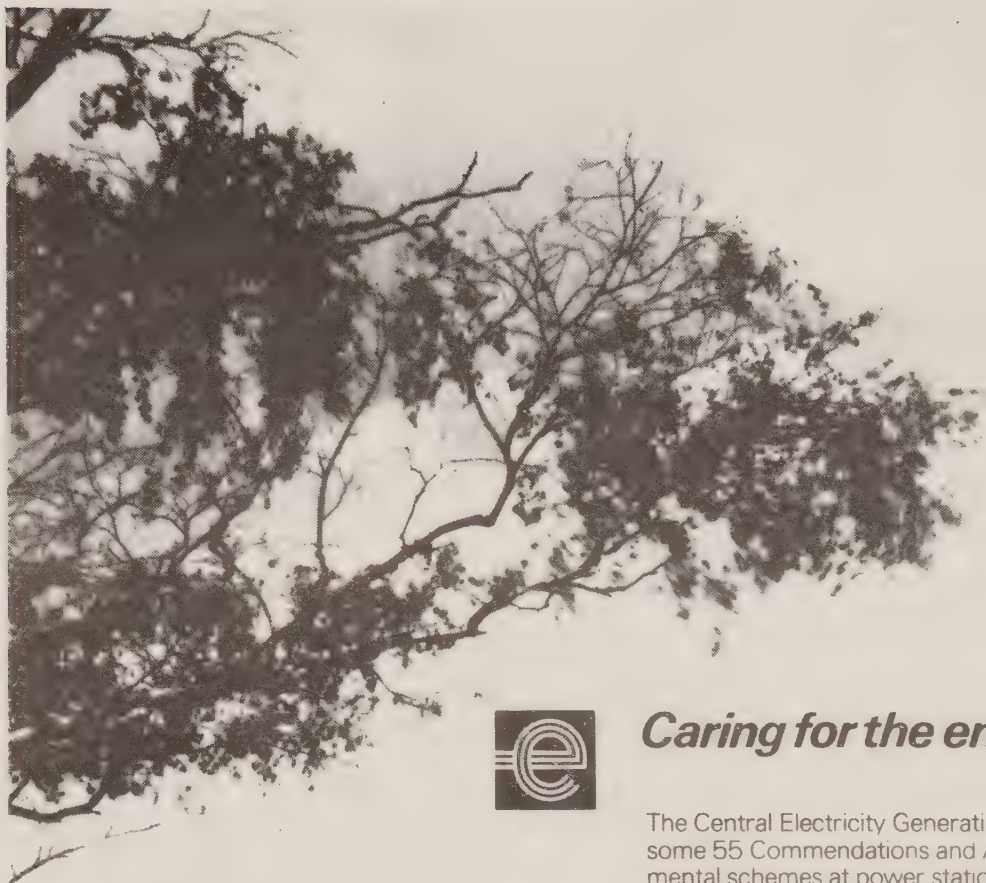
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Environmental Policies in Britain

The Society warmly welcomed RCEP's 9th report, "Lead in the Environment"; as the enclosed newsheet points out, the parallels between NSCA policy on lead and the Commission's findings are unmistakable. The immediate Government acceptance of the lead free petrol recommendation constituted a resounding success for campaigners. Not surprisingly, their influence was played down by Mr. Tom King, who preferred instead to talk of Government's responsible approach, of petrol as the largest source of lead controllable on a national basis and directly amenable to Government decision. However, it is doubtful whether ministers would, as Geoffrey Lean revealed in *The Observer*, have met with the Commission's chairman to receive an authoritative account of the report's findings in advance of publication, had there not been the outside pressure exerted by the campaign for lead free petrol.

The Royal Commission performed an impressive job, but their reanalysis of economic implications should have been undertaken by Government. Advisers in the various departments failed to draw attention to the shift in the balance of benefits versus costs, and ministers were left to appear stubborn in the face of public opinion which favoured a substantial reduction in environmental lead levels, and the elimination of lead from petrol. Eventually, ministers made a political judgement on the basis of prudence and commonsense. One factor in the delay was hinted at by Mr. King, when he said that the oil and motor industries had been adapting their position over the past two years — an indication that a process compounded of pragmatism and fatalism was at work.

If the degree of attention given to lead in petrol appears to some people disproportionate, the remedy, again, is in Government's hands. A well constructed strategy for the environment would provide the framework for progressive rather than reactive policies on specific issues, and for properly planned expenditure on research and controls. The issue of acid rain is now exposing the lack of cohesion in the British approach. Outside pressures and research findings in this country and abroad are both significant, but the UK's official line appears ambivalent and weak. Open discussion is needed to achieve a rational organisation of policy. The Society's 50th Conference will provide the opportunity for this, for other specific issues to be aired, and for trends and control options to be reviewed. The NSCA welcomes the participation of all sides in the process.

nsca TORQUAY 1983 50th CONFERENCE

AIR POLLUTION CONTROL IN THE UK
ACID RAIN
ODOURS AND ENVIRONMENTAL STRESS
CURRENT ISSUES ON NOISE
ENVIRONMENTAL PROBLEMS
ASSOCIATED WITH SMALLER INDUSTRIES
MAJOR ENVIRONMENTAL HAZARDS
AND THE
PROTECTION OF THE COMMUNITY

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to
Thursday 3 November**

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136 NORTH STREET — BRIGHTON BN1 1RG
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Report on the 1983 Workshop

Coal and the Community

Held at Sheffield University, 23 & 24 March 1983

When the Society's Yorkshire and Humberside Division gave its enthusiastic backing to the idea of holding a workshop on coal in Sheffield, it was thought that the subject would arouse considerable local interest. The workshop was structured to examine the environmental impact of coal winning, by both opencast and deep mining methods, and the implications of greater exploitation and use of coal in years ahead. The Society invited speakers from planning and environmental health departments of authorities with wide experience of the coal industry, and speakers from various branches of the NCB, to present their views on the application of current technology and future prospects for both the industry and the environment.

More than 80 people attended the workshop, with a strong contingent coming from the South Yorkshire County Council and from authorities in the Yorkshire area. Several of the local authority delegates were councillors with close NUM links, many of whom represented mining areas in Yorkshire. The Department of the Environment, the Health and Safety Executive, the Coal Board and the Coal Trade were also represented.

The Lord Mayor of Sheffield, Councillor G. Wragg, JP, opened the Workshop on the Wednesday morning, giving delegates a warm welcome and reminding everyone of Sheffield's deep commitment to Clean Air and the work of pioneers such as Alderman Mrs. Patience Sheard, who devoted so much of her time and energy to promoting

the programme of smoke control in the City. He stressed Sheffield's commitment to the work of the National Society of Clean Air, which was reinforced recently when David Bird of Sheffield's Environmental Health Department took over from Mr. Twyford as Hon. Secretary of the Yorkshire and Humberside division. Mr. Bird, Mr. Ivor Barker, Sheffield's Director of Environmental Health, and the whole Sheffield Council gave tremendous support to the Society in helping to run the workshop and ensure that it was a great success.

OPENCAST MINING

The first working session on the Wednesday morning considered opencast mining, with papers presented by **Gerry Millington** of Wakefield MDC on "Environmental Problems and the Protection of the Community", **Russell Jackson**, also of Wakefield MDC, on "Opencast Blasting", **Mr. G.J. Maskrey**, Regional Opencast Director Number 5 Central East Region, NCB, on "Noise and Dust Control and Land Restoration" and **Geoff Fieldhouse**, Chief Planner, Development and Projects, South Yorkshire CC, on "Planning and Programming: Procedures and Practices".

Opencast extractions on a national scale began as an emergency measure during the 2nd World War and the procedures were formalised in the Opencast Coal Act of 1958 and the Coal Industry Act 1975. Opencast coal sites were formerly restricted to a depth of about 12 metres with a ratio of overburden to coal of about 5:1,



Spoilheap — before and after removal. *(Photographs courtesy of the National Coal Board)*



Transporting coal by rail (merry-go-round). *(Photograph courtesy of the National Coal Board)*

but can now be worked to a depth of over 70 metres and with overburden ratios of 25:1. There are some 60 opencast sites in the UK, mostly in the traditional coalfields which have already borne the brunt of deep mining. *Gerry Millington*, looking at the controls available to local authorities to reduce the impact from opencast mining, highlighted specific aspects of operations which adversely affect the attitudes of people living in the area. These include the dangerous nature of the site, increased road traffic movements, the devaluation of and damage to property, vibration, noise and dust.

Russell Jackson gave a complementary paper dealing specifically with opencast blasting, not so much on engineering techniques or practice, but on the essential aspect of communication between opencast managers and the community as represented by the local council. In his slide presentation, he showed one blasting sequence in detail, describing at each stage the anticipated effect and the measures taken to deal with them. Such graphic description helped to drive home the scale of operations and the potential for impact that such activities have.

People who live and work in mining communities and near opencast mining sites obviously have a greater understanding of the needs of the industry and the environmental problems it creates, but it can still be difficult to anticipate the full effect of a development beforehand.

Geoff Fieldhouse argued that the present opencast procedures and practises do not allow full weight to be given to local opinion and environmental considerations. He presented a case for changes that would bring opencast mining within normal planning controls, and considered that his

arguments were given even more urgency by the possibility that the NCB will come under increasing financial pressure and might be tempted to regard opencast coal mining as an essential, attractive and permanent part of its operations.

Speaking on behalf of the industry, *Mr. Maskrey* explained first exactly how the Opencast Executive operates in the UK. Some 14 million tonnes of coal per annum are produced from opencast sites by the letting of contracts to civil engineering contractors. The Executive has an overall supervisory role once operations are underway, and is responsible for applying to the Secretary of State for Energy for an authorisation (except for private sites). Written into the contract awarded by the Opencast Executive are specifications drawn up to meet requirements imposed to protect the environment. A site engineer is employed to ensure that such conditions are met. The local authorities could, for example specify which roads should be used by vehicles travelling to and from the site, although their powers to specify requirements for noise and dust control in advance are limited.

During the discussion, **Councillor T.E. Short** of Nuneaton and Bedworth BC said that contractors tended to take short cuts in the interest of profitability, which were detrimental to the environment. For example, lorries leaving both public and private sites tended to be overloaded and to exceed the speed limit once on the road. *Mr. Maskrey* pointed out that when drivers were discovered to be taking short cuts etc. they were usually disciplined, since contractors faced the prospect of losing their contract if such incidents occurred frequently. **Mr. Marsden** of South Yorkshire County Council questioned the need for the current level

of opencast coal output. He felt that it could not be justified in the light of the general contraction in the coal industry. *Mr. Maskrey* said that current output had been based on a target of 15 million tonnes a year, determined in the 1974 Plan for Coal. Opencast mining also produced a variety of very specialised coals which could not be provided in sufficient quantity by deep mines. Both Government and NCB policy was that reserves that could be mined by opencast operations should not be sterilised by development; therefore sites had to be worked before further use could be made of them (a policy which he felt the CENE report had endorsed to a certain extent).

Finally, he pointed out that the operation provided holes in the ground for the disposal of both deep mines' spoil and industrial waste. At present, it was difficult to reduce the production level since the 14 million tonnes currently mined was all coming from existing sites.

Stephen Carden of Barnsley MBC said that while no one could deny the improvement in methods of opencast working that had been achieved recently, environmental disturbance was still being caused and people were entitled, under both Common and Statutory law, to be protected from nuisance. He saw no reason why the Opencast Executive should enjoy a privileged position in that respect. *Mr. Maskrey* replied that it was Central Government, not the Opencast Executive, that had established that "privileged position".

Mr. Jackson felt that from the technical point of view there was hope that one day colliery spoil heaps could be formed, and opencast coal sites worked, without many of the environmental problems that had been discussed. The difficulty lay in coping with problems in the interim. While a

time period of 10 years was short in engineering terms for the achievement of better standards, it seemed a very long time in the lifespan of an individual affected by opencast operations. He felt that if pressure for progress could be sustained, and communication improved on all sides, the future prospects were good.

Mr. E.J. Franklin from Wigan MBC supported the need for good communication and felt that liaison committees were invaluable. Discussing the imposition of noise boundary levels, rather than the use of a BPM policy as favoured by *Mr. Millington*, *Mr. Franklin* said that Leqs could be usefully and flexibly employed to satisfy what seemed to be a general belief among members of the public that there were noise levels which should not be exceeded. *Mr. Millington* replied that his own support of BPM rather than the imposition of specific levels was based on his authority's experience in the Wakefield area. Obviously other authorities viewed their opencast sites in their own way and had to develop practices out of their own experience.

DEEP MINING AND SURFACE HANDLING

The afternoon's discussion centred on deep mining and surface handling operations. The first paper was given by *Nevil Parkinson* who, as CEHO at Selby, has acquired considerable experience of the coal industry and its potential for impact on the local community. Selby already has a relatively new conventional deep mine, Kellingly Colliery, which currently produces in excess of two million tonnes of coal per annum but the new Selby project will have an output of 10 million tonnes per annum and fifteen million

tonnes of coal will be burned each year in the district, at the two modern power stations, Drax and Eggborough. Selby Council has been closely involved in preliminary planning and site development and while the coal industry is a rich source of revenue for the area, development on that scale will change the character of the district considerably. Population alone will grow by some twelve to fifteen thousand over the next ten years and already some residents have found the environmental changes hard to accept.

Mr. Parkinson described, sometimes with the benefit of hindsight, the disruptions to the local environment, paying particular attention to noise and waste disposal. Some of the problems encountered were obviously very difficult to anticipate; for example at the public inquiry the NCB had given an assurance that the ash/waste content of the Barnsley seam would be about 4 to 5 per cent, which would have resulted in about half a million tonnes of waste. The Board had faced considerable cross questioning on the point, which was obviously of great concern to the Selby Council. Already, however, on the basis of the very little actual mining that had taken place, it was clear that the ash content of the seam was greater than had been anticipated and would be more in the region of 18 to 20 per cent, entailing production of about two million tonnes of waste. That was just about tolerable since the waste could be sent with the coal to the CEGB to be milled into pulverised fuel and eventually disposed of via the stack or as p.f. ash. But if there was any more waste the CEGB could not cope, and washery banks might eventually have to be used. Ten million tonnes of coal emerging at one central point was a very large quantity to wash if indeed that had to be done.

Mr. Parkinson's advice, given both in his paper and during the discussion, will be extremely valuable to authorities faced with the possible exploitation of new coal measures in the future. He stressed the importance of local authorities using well qualified and independent consultants who could protect the interests of the council and the local community at the same level of expertise as those consultants used by any national undertaking.

Mr. M.J. Willock, General Manager (Special Duties) with the National Coal Board, gave a very interesting paper on transport handling and storage of coal, using slides to illustrate the most recent developments in conveyors, containerisation and stock control. His experience at the Immingham bulk terminal, where the best and most modern techniques have been applied to the management of both the construction and the operation, was reassuring. For example, it was found that coal could be stacked up to twelve metres high and in heaps of over thirty thousand tonnes each without creating dust problems; the coal tended to form a crust on the outside face so that even in high winds there was no dust problem. In contrast, stockpiles of iron ore fines and coke breeze had to be treated by spraying to prevent dust blowing about.

Mr. Willock emphasised that the problems of coal storage and their solutions were common to many different areas of the world and good communication between managers at different sites and in different countries ensured that valuable experience could be passed on and applied elsewhere. For example, the main problem with the unloading of dusty cargoes lay in the tremendous displacement of air when grabs full of ore or dusty coals were emptied into a hopper. The uprush of air took hold of

the fines, putting them into the wind-stream so that they blew away. The problem could be overcome by putting a ring of sprays round the hopper so that anything going in or coming out passed through a spray of water. Simple corrugated sheets put up at the side cut down the cross wind draught. **Mr. John Clarke** from the CEGB endorsed Mr. Willock's remarks and said how impressed he had been with the operation of the coal handling terminals in Sydney Harbour which were coping with a large traffic of coal right in the middle of the city and creating very little nuisance.

Mrs. Jennifer Connolly, South Yorkshire C.C., asked Mr. Willock for some comment on the possibilities of using canals in the transportation of either waste or the coal itself, particularly in the Yorkshire area. She was supported in her question by **Councillor R.J. McElvenney**, who pointed out that the South Yorkshire CC and the British Waterways Board had put a great deal of money into the improvement of the South Yorkshire navigation canal, a project towards which the EEC had also contributed. The South Yorkshire CC's £1 million input had been made because it had been assumed, on the basis of a nodding agreement with NCB, that a great deal of coal would be transported along the canal thus making it a viable proposition. However, when the project had been drawing to a close and most of the improvements had been implemented, the NCB had backed out. *Mr. Willock* said that he had a very soft spot for canals and water transport but in most areas of the UK their location, relative to possible collieries that they could serve, presented problems. Work had been done into the feasibility of such movement but costs were exceptionally high. The NCB constantly fought to retain prices at a level which made coal attractive

to the customer, and could not afford to add on costs which would make serious inroads into the market for coal.

FUTURE USE OF COAL

Proceedings on the Thursday centred on the future use of coal, with **Mr. Laurie Penzer**, Deputy Director General for Marketing, NCB, presenting a paper on the industrial and commercial use of coal and national policy. The Coal Board's research and development has concentrated on creating the technology with which coal can reclaim industrial markets and deal with the environmental aspects of an increase in both industrial and commercial use of coal. Coal now enjoys a price advantage over competing fuels, although Mr. Penzer pointed out that while the demand for energy overall in the UK will not actually fall, it is not likely to increase at the previously predicted rate. The Board have concentrated on improvements to conventional combustion equipment as well as the development of new techniques, such as fluidised bed, which will make coal more attractive to the industrial consumer. He pointed out that the impact of an individual coal burning plant upon the immediate environment will depend largely upon plant design, load pattern, adherence to maintenance procedures and a high standard of good housekeeping. Environmental problems, he said, were relative and not absolute matters, which added to the unit cost of the energy. In the current industrial recession he considered it difficult to achieve what was ideally desirable in the field of environmental protection at prices which industry could afford. The Board had been leaders not only in developing better technology for coal combustion and ash handling etc., but in putting pressure on Government to provide some financial incentive to

industry to change to coal. The Board supported by boiler plant manufacturers, had eventually persuaded the Government to part with some £50 million in grant aid to industry. With the Coal Board taking the lead in this way, it made it easier to pressure boiler manufacturers to meet environmental protection standards. The Board also had a highly competent technical services team who could be called upon to advise on plant design, commissioning or operation.

Ivor Barker of Sheffield MBC, gave a controversial and very well received paper on the environmental consequences of future coal use. After reviewing the means by which the present clean air standards have been achieved, he argued that this achievement could be placed in jeopardy by the renaissance of coal as the nation's primary energy source, unless proper safeguards are introduced to protect clean air. (Mr. Barker's paper is published elsewhere in this issue.) It was clear that most of local authority delegates supported his views and were keen to anticipate any return to large scale coal use by industry or in the domestic sector, with adequate and effective controls.

Before Mr. Penzer and Mr. Barker spoke, **Mr. Harry Giblin**, Immediate Past Chairman of the Society and General Manager of the Solid Smokeless Fuels Federation introduced the Federation's new audio visual which gave dramatic force to clean air arguments and showed the benefits that could accrue from using solid smokeless fuel in the domestic sector.

Stephen Carden said that while he had been watching the excellent audio visual, he could not help reflecting on the irony of the serious environmental disadvantage suffered by those in the immediate vicinity

of some manufactured solid smokeless fuel plants. This point was taken up by **Councillor M.J. Porter**, who represented Askern, a small industrial mining town in South Yorkshire, where there was a pit and a smokeless fuel manufacturing company side by side. The plant took all the grime and smoke from coal so that smoke control areas could have clean fuel to burn but the local environment around Askern suffered from a burden of pollution which he regarded as intolerable and which he felt required a far greater degree of control. *Mr. Barker* agreed that people living in an area dependent upon a basic industry should not have to put up with severe environmental benefits, which would never be tolerated by the people who benefitted from using the product. He mentioned the Society's campaign in South Wales, concerning the Phurnacite plant at Abercwmboi, and the continuing struggle to improve environmental standards at that plant. *Mr. Giblin* said that whenever coal was converted into another form of fuel, some emissions could result, much as that was to be regretted. He considered that the manufacturers were far from complacent about any problems caused by their plants, and were very conscious of the need for improvement as and when possible.

Discussing the prospect of an increasing switchback to coal use in industry, several delegates mentioned the problem posed by particular "rogue" plants in their respective areas. **David Bird** of Sheffield MBC said that the council was facing the need to approve an increasing number of chimney heights; he strongly supported Mr. Barker's view that the transition to coal in industry was already underway, and that local authorities needed more effective powers of control.

Councillor Laurie Harrison of South Kirkby and Moorthorpe Town Council brought up the perennial problem of pursuing smoke control in mining communities. He said that it was "electoral suicide" for councillors to try to push through smoke control orders without having persuaded the community beforehand of the superior benefits of clean air over the concessionary coal allowance. He felt strongly that it was the Society's job to get out into the mining communities, talk to representatives from the NUM and the Coal Board, and put the clean air message over direct to the public.

Mr. Bernard Twyford, Chairman of the Society's Council and Chairman of the day at the workshop, said that the Society thoroughly supported the need to educate and inform people about the value and importance of clean air. It was constantly looking for ways in which it could try to get the message across. The Society recognised that it was sometimes preaching to the converted and he welcomed suggestions as to where future efforts could be directed. **David Bird**, speaking as Hon. Secretary of the Yorkshire and Humberside Division, considered that the Division did a great deal in the Yorkshire area but pledged his support for any specific educational or training effort in conjunction with the NUM or the NCB.

Mr. J.L. Dutton of the Coal Merchants Federation, North West, took up Mr. Twyford's invitation to advise on future action which the Society might usefully take. He pointed out that the workshop had heard from most sides in the coal industry, with the notable exception of the

people who actually sold the fuel — the coal merchants. He emphasised the effort expended by the trade in persuading their members to comply with clean air legislation, and the trade's investment in developing efficient methods of burning coal and in training not only their own members but architects, chimney sweeps and others on the requirements of all relevant legislation including the Clean Air Acts. He felt that there was a clear need for close co-operation between the coal industry and trade and the community as represented by the National Society for Clean Air up and down the country. He also felt that it might be useful for councils to prosecute householders instead of or as well as coal merchants, when bituminous coal was found to be in use in smoke control areas. He said that householders put pressure on the trade to break the 1968 Clean Air Act, because they found alternative sources of fuel not controlled by for example the Approved Coal Merchants Scheme.

Discussion throughout the workshop was lively and informative; the two chairmen: Cllr. McElvenney on the Wednesday and Mr. Twyford on the Thursday, controlled the proceedings with just the right, light touch on the reins. The Society's thanks are due to the speakers and indeed all the delegates who took part in the debate, and to the Sheffield City Council who were generous and most friendly hosts. Delegates were given a marvellous civic reception in the imposing Town Hall on the Wednesday night, when again the Lord Mayor's welcome made it clear that Sheffield has the interests of the Society and Clean Air very much at heart.

The Proceedings of the 1983 Workshop are now available from the Society. Individual papers are 95 pence each, and the full set of papers, together with the Report of Discussions, is £7.95. Prices are inclusive of post and packing. Please enclose remittance with order.

Coal and the Environment

Since the Sheffield Workshop was held, the Government have published their response to the CENE Report on Coal and the Environment. This appeared as a White Paper, Cmnd. 8877, on 12 May 1983.* The Government have accepted the Commission's main finding that, subject to important qualifications concerning spoil disposal, opencast extractions, and sensitive treatment of those affected by subsidence, there are no insuperable environmental obstacles to the role of coal as currently envisaged. In particular, they agree that the expansion of a modernised coal industry need not have any damaging effect on the environment.

The White Paper states that the same environmental standards should apply to the coal industry as to other mineral operators and developers, and that the industry should generally bear the cost of meeting these standards. There is acknowledged to be too wide a gap between the environmental standards rightly expected at new mines and those commonplace in many established mining areas. Government commitment to improved environmental standards in older coalfield areas will concentrate in particular on clearance and reclamation via the derelict land programme. On air pollution arising from coal use, the White Paper expresses Government determination to maintain present standards: "any large scale return to coal as a fuel for domestic or industrial use should not reverse — as indeed it need not — the substantial gains in air quality achieved over the last two decades." The Government have endorsed the Commission's proposal that planning authority over opencast developments should be transferred from the Energy Secretary to local councils. The Government also agree that the environmental effects of opencasting should be minimised, through careful attention to such problems as dust, noise and vibration, both at the planning and the operating stages. On coal handling, the Government welcome progress in developing automatic sheeting devices for lorries and the NCB's decision to introduce a Code of Practice to control dirt and dust arising from all lorries leaving NCB sites.

AIR POLLUTION

The Government accept that there would be widespread opposition to increased coal-burn, should it result in higher air pollution levels. Any such effects, says the White Paper, are likely to be most marked in urban areas; the Commission were right to warn potential users and control authorities against complacency about the possible environmental consequences of greater coal use. Uncertainty about the pace of coal's repenetration of markets could not excuse inaction. However, while agreeing that smoke should be kept to the "lowest practicable level", the White Paper makes no commitment to an extension of local authority controls to include prior consent powers over choice of fuel, means of controlling emissions, or direction over use of particular fuels in some

* DoE, DoEnergy, Scottish Office, Welsh Office: Coal and the Environment. The Government's Response to the Commission on Energy and the Environment's Report on 'Coal and the Environment'. Cmnd. 8877. May 1983. London, HMSO, £3.60 net.

building. These matters, and the extension of the BPM approach to processes controlled by local authorities, would be fully considered in the context of the comprehensive review of air pollution control legislation. Government proposals will be issued in due course as a consultation paper, and will take into account the likely impact of increased coal-burn. "The Government expect them to go most of the way to meeting the concerns expressed by the Commission."

While agreeing with the Commission's view that industrial coal-burn can be positively encouraged in most circumstances, the Government endorse the NSCA view that greater attention should be paid to ensuring high standards of maintenance and control. On the domestic side, 'solid smokeless fuel versus smoke eating appliances' is not considered to be a clear cut issue: "technically the production of solid smokeless fuel need not cause severe pollution problems although there might be cost penalties in avoiding doing so." Nevertheless, the Government agree that the environmental acceptability of direct coal-burn in the domestic sectors must depend on the availability of suitable smoke-reducing equipment, and the NCB and manufacturers will be expected to maintain their efforts to produce more reliable equipment. Should an increase in domestic use of coal or solid smokeless fuel replace the use of gas, electricity or gas oil, the situation would need to be very carefully watched in relation to the EC air quality directive. "The Government therefore recognise the need to keep the position under close review."

The NCB are bringing together local authorities, transport operators, manufacturers and potential individual consumers in a series of regional conferences (on similar lines, presumably, to that held by the NSCA at Sheffield), with the aim of discussing the scope for and likely impact of greater coal-burn.

While noting the Commission's view that, if air pollution is kept at a level low enough to protect human health, there should be no cause for concern about effects on crops, vegetation or materials, the Government consider that further evidence is needed and that research should continue. The White Paper refers to "acid rain" as a significant political as well as environmental issue. "All countries in a continent contribute to the emissions that may cause acid deposition in other countries, and all must participate in a search for effective and equitable solutions." The Government's stated intention is to continue to work positively to that end, within the framework provided by the ECE Convention.

NEW TECHNOLOGIES

Heat pumps could offer significant increases in efficiency, the White Paper says; work to develop cost-effective domestic heat pumps and advanced fossil-fuel heat pumps for industrial and commercial premises will be continued. The Commission saw emission control advantages in new coal-fired district heating schemes but there are technical difficulties in developing cheap and reliable heat meters, which could provide an equitable method of billing customers. The UK's strong position in fluidised bed technology should be maintained, Government agree, to secure improvements in efficiency and control of sulphur and nitrogen oxide emissions. SNG production is being kept under active review.

OPENCAST OUTPUT

The White Paper makes it clear that the Government will not be drawn into devising a national plan for energy. Rather, they believe that a freer and more competitive market will regulate energy supply and demand with greater success and efficiency than central planning with its over-reliance on uncertain supply and demand forecasts. This principle is extended to opencast mining, in spite of reservations about the environmental dis-benefits. The Government wish to move away from the idea of a government-endorsed target or ceiling on opencast output, and allow the appropriate level of output in the longer term to be decided by market forces, subject to the acceptability of individual projects. The NCB will therefore have to set its own opencast output level and attempt to justify it on a case by case basis through the planning system.

NEED FOR POSITIVE COMMITMENT AND GOOD LIAISON

In conclusion, the Government agree with the Commission that most potential environmental problems from any increase in coal production and use can be overcome by more widespread application of current best practice. Some changes in the framework of policy, legislation and controls (specifically mentioned is amendment of the 1958 Opencast Coal Act) will be required, and the White Paper identifies the continued commitment of many organisations and individuals as essential to secure higher standards within the existing framework. The Government welcome the progress that the NCB have already made in giving greater emphasis to environmental policy, but say that the best test of the value of their approach will be whether tangible improvements are made to existing practices within a measurable period. The White Paper stresses the importance of good relationships between the industry and local authority, particularly in the older mining areas when restructuring takes place.

LORDS DEBATE 'AIR POLLUTION CONTROL'

The first parliamentary debate on 'Air Pollution Control', the Government's belated response to the Royal Commission's 5th Report, took place on 23rd March in the House of Lords. *Lord Ashby*, founder Chairman of the Royal Commission on Environmental Pollution, asked what steps the Government proposed to take to introduce the principle of "best practicable environmental option" into their policies for protecting the environment. He was supported in his question by *Lord Flowers*, Chairman of the Commission at the time it produced its 5th report. Lord Ashby, and other participants in the debate, was critical of the Government's "dismissive" reply to the report. He called Pollution Paper Number 18 "a pretty example of Whitehall dialect, but hardly the way to ensure a national strategy."

Lord Ashby referred to the July 1981 letter signed by the Presidents of the NSCA, the CBI and the IEHO, which had urged the Government to remove the Alkali Inspectorate

from the Health and Safety Executive and return it to the Department of the Environment. He said that the continued presence of the renamed Industrial Air Pollution Inspectorate within HSE contradicted a principle of environmental policy which has been painstakingly developed over the past 120 years. "The purpose of the first Alkali Act in 1863 was not to protect man from the hazards in the environment; it was to protect the environment from the hazards caused by man." The Inspectorate did at present retain their identity, he said, but there were "signs that they may slowly become merged in the Factory Inspectorate."

Lord Ashby said that it was too late now to expect Government to take the advice of the Royal Commission, supported by the Presidents of associations dealing with industry, pollution and health; he wished simply to record the "widespread dissatisfaction" with the decision to retain the Inspectorate within the Health and Safety Executive, and the way in which the decision was made.

On the Royal Commission's recommendation for a combined industrial pollution inspectorate, Lord Ashby said that the policy of best practicable environmental option (BPEO) could only be achieved if some small expert body could decide the overall strategy for disposal and recycling of waste in Britain. The Government had acknowledged the "unassailable logic" of the argument and had said that the concept was one of "considerable power and utility" but had then gone on to suggest that in practice it would not be much use, and proposed instead to "look to" all pollution control authorities to take account of the principle enunciated in the report.

Lord Flowers said that the Government had accepted the objectives set by the Royal Commission but had failed to provide the tools. He pointed out that the concept of HMPI — "these superior arrangements" — was accepted North of the border but rejected for the South: "Do they think that the thistle needs more protection than does the rose, or the leek, or that other countries with their environmental protection agencies have got it wrong?"

Lord Mottistone, the CBI's spokesman, said that industry did not need a control inspectorate with executive powers solely to oversee the implementation of BPEO. What was needed was an independent technical advisory body embracing all forms of pollution control — a National Pollution Advisory Council — which should be kept as small as was consistent with covering all necessary engineering and scientific disciplines. He recommended, as a start, the establishment of a small advisory unit within the Industrial Air Pollution Inspectorate, which could form the core of the proposed new council. Industry's view of BPEO was that the definition must embrace local environmental circumstances, age of plant, and financial and economic factors. It should not mean the application of the best technology or the same technology to one or more similar industrial plants.

Baroness Nicol concentrated on the planning contribution to pollution control and asked why the Government did not consider that consultation between planning and

pollution control authorities should be mandatory. *Lord Flowers* expressed the hope that, in the absence of compulsory consultations, the Government's new advice on planning and pollution control would be quite precise "because it should not be assumed that it will invariably be accorded intelligent interpretation".

Baroness Robson of Kiddington also agreed that the Alkali Inspectorate should have remained independent of HSE. She was particularly concerned that Britain should accept its responsibilities for pollution problems, especially acid rain, in other countries. The UK, she said, had failed to implement solutions that could help the Scandinavians; the Government should show the rest of Europe the fullest co-operation by applying the technical means now available for installation in sulphur-emitting plants. *Lord Melchett* said that as he understood it, no one was obliged to consider the effect of emissions on countries outside the UK. Britain, he believed, was seen as one of the worst air polluters in Europe and certainly the least caring and he asked for some information on what the Government would do to deal with the problem of acid rain.

Replying to the debate, *Lord Skelmersdale* accepted that the Government's deliberations on the 5th Report had taken too long. He said that the Government enthusiastically endorsed an openminded approach to pollution control but that the specific organisational proposals had caused some difficulty. He gave four reasons for the decision not to set up a central pollution inspectorate. First, the Government were not convinced that the extent to which there was a real choice between methods of disposing of pollution was sufficient to warrant the establishment of a new tier of administration. The Government were also against the centralised nature of the proposed pollution control body and considered that BPEO solutions were essentially matters for local decision. Local liaison panels or committees could provide the basis for co-ordination that the Royal Commission required; and, finally, the recently established organisational arrangement for pollution control should be given the chance to work.

Lord Skelmersdale said, however, that the Government had not firmly closed the door on the Royal Commission's suggestion, and that the different options for co-ordination would be discussed in the near future. Referring to the comprehensive review of air pollution control legislation initiated by the Government, he said that they were pressing on with all due speed. Not only did the adequacy of national legislation have to be considered, particularly in relation to the powers of local authorities, but also the arrangements for control in the UK in relation to new requirements emerging from Brussels.

On the question of the right home for the Industrial Air Pollution Inspectorate, Lord Skelmersdale said that it served both DoE and HSE. The Government thought it desirable that the professional groups dealing with industrial health and safety should work as far as possible within a common organisation, to provide a consistent basis for pollution control both inside and outside a works.

ASBESTOS

The extensive media coverage of the asbestos issue has highlighted the dangers to those working with asbestos, but there is also widespread public anxiety and uncertainty about asbestos in the home, in schools, hospitals and in workplaces where people may be incidentally exposed to health risks. Local authorities are usually at the sharp end of this public concern, and have to assess the degree of risk associated with the use of asbestos in buildings, particularly in council property. Environmental health officers share responsibility with the Health and Safety Executive for health and safety work enforcement outside the factory, which includes supervision of the use of asbestos in new building work and its repair, maintenance and removal. County Councils in England and District Councils in Wales and Scotland are the responsible authorities in relation to the disposal of notifiable asbestos waste.

Uses of asbestos in building products

Asbestos is the generic name given to a group of impure magnesium silicate minerals which occur in fibrous form. They are strong, durable and non-combustible which makes them suitable for fire protection, heat and sound insulation and for reinforcing cement, vinyl and other materials used in making building products. There are three main forms: white (chrysotile), brown (amosite) and blue (crocidolite). Chrysotile was the most commonly used in the past for building materials and is virtually the only one in use in currently available materials. Amosite was used in thermal insulation lagging up to the late 1960s and in sprayed applications up to 1974, after which asbestos was no longer used for this purpose. Amosite was most widely used, up to 1979, in asbestos insulating boards for fire protection. Crocidolite was used in thermal insulation lagging and sprayed coatings, but usually as the minor constituent in combination with chrysotile and/or amosite. It was never extensively used in building applications, and was not used after 1970. Crocidolite's particular application is in situations where mineral acids are present (chemical and gas works).

Health Hazards

Diseases attributable to asbestos are:

Asbestosis: fibrosis of the lung, specifically related to occupational levels of exposure, since it is usually produced by fairly lengthy exposure to levels of airborne dust in excess of the TLV.

Lung cancer: people who get asbestosis may also get bronchial cancer. The chances of developing lung cancer are substantially enhanced by smoking, since the effects of asbestos and tobacco are synergistic.

Mesothelioma: this form of cancer (growths in the lining of the lung or stomach) is linked with very small quantities of airborne asbestos, notably crocidolite. No lower limit for safety has yet been established.

Progress in asbestos controls

Occupational control limits

The new and tighter control limits for exposure to asbestos, recommended by the Advisory Committee on Asbestos (ACA) came into force on 1 January 1983. The limit for chrysotile (white asbestos) has been halved, to 1 fibre/ml of air; the limit for amosite (brown asbestos) has been reduced from 2 fibres/ml to 0.5 fibre/ml. The strict limit of 0.2 fibre/ml for crocidolite (blue asbestos) remains, effectively ruling out its use.

When ACA's third and final report was presented in October 1979, it contained 41 recommendations for new legal and administrative controls on asbestos at the workplace and for the general public. The Advisory Committee's first two reports dealt with thermal acoustic insulation and methods of measuring airborne asbestos, and were published in June 1978. An Approved Code of Practice and Guidance Note 'Work with asbestos insulation and asbestos coating' was issued in April 1981, giving guidance on relevant legislation concerning health risks during work involving thermal and acoustic insulation (including structural fire protection and sprayed coating) "to ensure that exposure to all forms of asbestos dust is reduced to the minimum that is reasonably practicable". The definition of "reasonably practicable" must now take into account the new control limits, and consultation is underway on necessary amendments to the Code and Guidance Note. Regulations prohibiting the application of asbestos by spraying, the use of asbestos in insulation, and the import and use of crocidolite are expected to be laid before Parliament in mid-1983.

Licensing

Proposals to strengthen and extend the scope of draft regulations on licensing of work with asbestos insulation and coating were contained in a consultative document published by the Health and Safety Commission on 29 November 1982.

Earlier draft regulations proposed that contractors involved in the removal of existing sprayed asbestos coating and asbestos based insulation should be licensed by the Health and Safety Executive. The new proposals suggest the extension of the licensing scheme to employers using their own employees, or self-employed persons, undertaking work with asbestos insulation and coating on their own premises, with an alternative of proving notifications of any such work to HSE; and provide for obligatory medical surveillance on a regular basis for employees and the self-employed in the asbestos coating and insulation industry.

The European angle

The introduction of these control limits has been delayed by the slow progress of two EEC draft directives on asbestos: on the protection of workers in the asbestos industry, and on the marketing and use of asbestos products. Parliament endorsed the need to

co-ordinate action in the UK with work on the directives. However, the prospect of continuing delays in the EEC negotiations – underway since 1980, and demands for swifter progress in the UK, prompted HSC to bring the more stringent occupational control limits into effect in advance of European legislation.

The EEC has already adopted a “parent” framework directive on protection of workers from exposure to harmful agents, in which asbestos was included as a particularly hazardous agent.¹ The draft “daughter” directive on worker protection,² which has been the subject of considerable debate since it was first tabled, provides for specific occupational control limits (1 fibre/ml for chrysotile and amosite, 0.2 f/ml for crocidolite) and is intended to prevent risk to the health of workers from exposure to all types of asbestos wherever these are extracted, transported, manufactured, applied or demolished. There has, for some time, been agreement on the principles underlying the draft directive, but Member States have differed on scope, monitoring strategy and control limits. On the 2nd June 1983, social affairs ministers of the EEC reached agreement on a compromise proposal, which has been politically adopted. This new Directive sets *limit levels* for asbestos fibres, which should not be exceeded in the workplace, of 0.5 f/ml for crocidolite, and 1.0 f/ml for other forms of asbestos. In addition, it sets an *action level* of .25 f/ml for all types of asbestos – which means that if there is that amount of asbestos in factory air, the employer will have to take action to reduce the level. This provision is similar to the improvement notice power available to UK enforcement authorities.

If levels of asbestos in the workplace exceed the *limit levels*, then, under the Directive, the works could be closed; again, a provision paralleled by UK requirements.

The application of the Directive will be reviewed three years after it comes into force on 1.1.1987.

The other draft directive, on marketing and use,³ originally proposed a ban on almost all products containing crocidolite; products containing all other forms of asbestos were to be authorised, except for those used in thermal and acoustic insulation, air filtering and roadway surfacing. These were to be allowed only on condition that harmful release of fibres was prevented. A revised proposal issued in October (OJ C273, Vol. 25, 16 October 1982) imposed further restrictions in the form of additions to the list of products whose marketing and use is forbidden unless the harmful release of fibres is prevented. “Harmful release” is defined throughout as concentrations in excess of 1 f/ml in condition of normal use, except for crocidolite products (in excess of 0.2 f/ml).

Disagreements over the revised proposal, however, have led to a radical revision of the approach to the Directive. It now appears likely that it will be split into two, with the ban on thermal and acoustic insulation and products containing crocidolite going ahead, together with some form of labelling. Restrictions on the other asbestos products might be included in a later Directive.

Public Exposure to Asbestos

Most measurements of asbestos levels outside the workplace show levels considerably below the new control limits and HSC has stated that its powers will be used to ensure that exposure generally remains well below, and never exceeds, the limits.

However, the Association of Metropolitan Authorities (AMA) has called for more research into health risks arising from the use of asbestos in homes and public buildings, and said that a new standard for asbestos in air should be introduced as the foundation of community health protection programmes. A survey of its 77 members by the AMA revealed widespread concern about the risks from damaged asbestos in houses, flats, schools and other public buildings.

The AMA acknowledges that there are practical problems in assessing the actual risks of low exposure, but in the face of growing demands from tenants and parents of school-children for the replacement of all asbestos, more guidance to local authorities is urgently required.

The AMA's survey showed that many authorities are undertaking regular inspections of council buildings in which asbestos has been used. In general no action is taken where asbestos sheeting is in good condition and undamaged. Repairs are undertaken where small areas are damaged, but where large areas are crumbling, cracking or damaged, sheets are replaced with a non-asbestos material. Several authorities have special units to deal with such work and some authorities now have an asbestos removal programme.

The AMA has sent the results of its survey to the House of Commons Employment Committee which is looking at problems related to asbestos. The AMA is calling for compulsory labelling of asbestos products, tighter controls over disposal and more public information from HSE and the Health Education Council, in the form of leaflets, films and information packs about proper ways of handling asbestos.

1. *Council Directive on the protection of workers from the risks related to exposure to chemical and biological agents at work*, OJ L327, 3 December 1980, pp 8 – 13.
2. *Proposal for a second Council Directive on the protection of workers from the risks related to exposure to agents at work: Asbestos*, OJ C262, Vol. 23. 9 October 1980.
3. *Proposal for a Council Directive amending for the fifth time Directive 76/769/EEC on the approximation of the Laws, Regulations, and administrative provisions.*

Further developments in asbestos research and controls will be reported in future issues of *Clean Air*. The next issue will carry a report on the NSCA North West Division symposium on Asbestos (30 June 1983).

A list of NSCA library holdings on the subject may be obtained from the Librarian, NSCA, 136 North Street, Brighton. Members of the Society may borrow library material free of charge.

Lead Free Petrol Commitment

Lead in the Environment. 9th Report of the Royal Commission on Environmental Pollution. Cmd. 8852. HMSO, April 1983. £9.20 net.

The Royal Commission's 9th report "Lead in the Environment" took a year to prepare; this relatively quick, but very thorough and comprehensive study was prompted by a number of organisations and individuals telling the Commission that lead was an issue of major and continuing concern to the public and the scientific community. The Royal Commission reviewed the sources of lead in the environment, the pathways by which it enters living systems, and its effect on man and animals. The report discusses a range of particular problems and possible measures to deal with them, with 29 firm recommendations for achieving further reductions in lead levels.

As the Commission's Chairman, Professor T.R.E. Southwood, put it: "The Commission has not harped on the shortcomings of various scientific studies, but has concentrated on making the best assessment of the available evidence and on drawing robust and practical conclusions."

The Commission's principal recommendation was for all practical steps to be taken to reduce man-made dispersal of lead, and human exposure to it, in order to provide a substantially greater safety margin for the population as a whole. While selective surveys have shown that blood lead levels in the UK population are generally dropping, the average blood lead concentration is about one quarter of that at which frank lead poisoning can occur. This implies a uniquely low safety margin compared with other environmental toxins. The Commission emphasised, moreover, that there is no basis for postulating a threshold concentration of lead in the body below which harmful effects do not occur, but they were unable to draw firm conclusions from the continuing research into the effects of lead on children's behaviour and intelligence.

The Commission could find no compelling argument for the retention of leaded petrol except as an interim measure, to enable the majority of existing cars to be phased out. While welcoming the major reduction in airborne lead that will be achieved by reducing the lead content of petrol to 0.15 g/l by the end of 1985, the Commission recommended that all new petrol-engined vehicles sold in the UK should be required to run on unleaded petrol by 1990 at the latest. They urged Government to initiate negotiations immediately within the European Community in order to secure the removal of the minimum level of lead in petrol, currently contained in Article 2 of Directive 78/611/EEC.

Half an hour after the report was presented, Environment Secretary Tom King announced in a statement to the House of Commons that the Government had accepted the Commission's recommendation on lead in petrol. The Under Secretary of State would, he said, write to Environment ministers in other EEC member states, setting out

the UK's position, with a view to opening negotiations as soon as possible. The Government would also be discussing a timetable for the introduction of unleaded petrol with UK oil and motor industries.

Responding to questions at a press conference after his Commons statement, Mr. King said that, rather than simply seek the removal of the lower limit in the Directive, he would prefer to seek a mandatory requirement from all member states to go lead-free by a certain date (and he was hopeful that it could be earlier than the Commission's 1990 target). He thought that the "cogent, well reasoned and analysed" Royal Commission report would have a considerable impact on international opinion and would be particularly influential in Europe.

Both the Commission and the Government considered it important to ensure a change-over to lead-free petrol on a European basis, to secure the continuing success of the UK oil and motor industries. The Commission said also that Europe wide action would help to reduce the amount of lead imported in foodstuffs from Europe and borne in the wind.

The Commission have not unearthed any new evidence on the effects of lead; they have taken account of studies published since the 1980 DHSS Working Party Report — and have reserved judgement. What they have done, however, is to take a fresh look at the contribution of lead petrol to lead in the human body, taking account of food and dust pathways, and come up with figures that are significantly higher than those in the DHSS report.

The other strength of the report is that it puts the costs of converting to lead-free petrol in the context of changing patterns of fuel economy: the Commission found that redesigning cars to run on unleaded, lower octane (92 RON) petrol would marginally increase overall energy demand, if other factors were assumed to remain constant. However, by the time the changeover takes place, any such energy penalty, besides being small in absolute terms, would be completely swamped by continuing improvement in car efficiency and fuel economy. "On a national basis, it is highly improbable that removing lead would be reflected in any higher absolute expenditure, and the impact on the individual motorist would be very small".

Reaction from the oil industry has been favourable to the 92 RON lead free proposal. For the motor industry, the UK Society of Motor Manufacturers and Traders (SMMT) suggests that the change would mean direct investment costs of between £100m and £350m, depending on time scales. (Eventual additional costs to the motorist would be about 1p per gallon for petrol and between £10 and £60 on the price of a new car.) However, concern has been voiced by at least one motor company about the prospect of low grade 92 RON lead free petrol. Ford Motor Co have stated their preference for 95 RON unleaded fuel, since this would allow them to retain the benefits of much of the research now being completed on the next generation of fuel-efficient engines.

The report contains a number of recommendations for further action to reduce

exposure to lead in water, paint, food and drink. On tap water, the Commission recommended that an early and firm target date should be set for substantial completion of all surveys, investigations and remedial work, and that financial constraints should not be allowed to hamper the rate of progress. The report points to the surprising lack of information in some limited areas of the UK on the existence or the extent of any problems associated with plumbosolvency. Mr. King said that such surveys would be completed as soon as possible, but made no promise of additional financial commitment from central sources. The Commission welcomed moves by a major can manufacturer to phase out the use of lead solder. They recommended that there should be a continuing effort to gain better understanding of the various pathways and mechanisms by which food is contaminated by lead. On paint, the report recommends greater attention to publicity to alert the public to the potential hazards of old, leaded, paintwork, and the best way of removing it where necessary. The lead content of paint, it says, should be reduced to the US level, and in the meantime all paint containing more lead should carry a warning label. The Commission also considered that local authorities should review techniques and equipment for the detection of lead in paintwork. At the press conference to launch the report, Mick Archer demonstrated the effectiveness of the portable X-ray fluorescence instrument in use in the UK, which gives a reliable and instant readout measurement of the lead level in paint. Although the instrument is expensive initially (about £3000) once purchased there would be no need for time-consuming sample collection and expensive chemical analyses.

There is an enormous amount of food for thought for local government as well as Environment ministers in this report; it is most valuable in that it draws attention to areas where effort and money should be directed, both in the short and the long term, and it gives local government a very good case for hammering on Whitehall's door in short order if the promised Government response is unduly delayed.

As for lead in petrol, the battle is not yet won. The co-operation of all EEC member states must now be secured, and some of them may not be easy to persuade. The European Parliament's Environment Committee has recommended the adoption of a lead free petrol programme for the EEC, and on Monday June 6 the European Parliament voted, by an overwhelming majority of 76 to 6, for lead free petrol to be introduced within the EEC "as soon as possible". MEPs called for an interim reduction in petrol lead content to 0.15 g/l by 1985 at the latest, and asked the Commission to submit to member governments a "reasonable timetable" for the introduction of lead free petrol. All this is in line with UK policy, and whatever the outcome of the British election, environment ministers will, on the basis of party commitments, continue to press other EEC member states to introduce lead free petrol on a European basis as soon as possible.

LEAD LEAFLET

The NSCA leaflet 'Lead and You — Reducing the Risks' is available from the Society at £3.00 per 100 copies, or £19.00 per thousand. There is a 10% discount on orders of 5000 or more. Prices are inclusive of post and packing.

Environmental Consequences of Future Coal Use

by

I.W. Barker

Director of Environmental Health, Sheffield MDC

THE BASIS FOR CLEAN AIR

A review of the past quarter-century of smoke control suggests that the achievement of clean air in the United Kingdom was due no less to the workings of fuel market forces than to the commitment of enlightened local authorities.

There were two major influences which enabled the reduction in gross atmospheric pollution to be accomplished. The first was the passing of the Clean Air Act 1956 to be accomplished. The first was the passing of the Clean Air Act 1956 and the provisions it contained (quite revolutionary at that time) enabling local authorities to create Smoke Control Areas and thus effect a progressive and significant reduction in low level smoke emission from domestic chimneys. The second was the availability of cheap oil and natural gas from the Middle East which brought about a sudden and quite dramatic change in the pattern of industrial fuel consumption.

Local Government responded eagerly and vigorously to the challenge of cleaning up the air. The task was formidable. Even with the powers afforded by the Clean Air Act, the means by which clean air was to be achieved were really quite modest, consisting almost exclusively of the payment of small monetary grants for the adaption of domestic fireplaces to enable them to burn gas coke — the one solid smokeless fuel universally available in sufficient quantity to replace house coal.

Initially, progress was slow and smoke control orders were frequently contested at public inquiries. Smoke control was unpopular not only because householders saw it as a gross interference with individual freedom, but also because the choice of clean fuels was seriously constrained by the amount of grant given for conversion, which was based on the cost of a solid smokeless fuel adaption. There was a very real possibility that the evolution towards clean air could founder. Then, in the early 1960s, industry began to respond to the availability of "cheap" imported oil and gas. These fuels had, additionally, various operational advantages: they were easy to burn, and compliance with new Clean Air Regulations, including Smoke Control Orders, was greatly facilitated.

The increased availability and demand for the convenience fuels meant that the process of manufacturing town gas from coal rapidly became obsolete. Initially it



Sheffield, looking towards the industrial east end (Lower Don Valley); the contrast between the two views shows the benefits of clean air. *(Photographs courtesy of Sheffield City Council)*



resulted in the wholesale closure of gas works and a rapid run-down in the gas coke production on which domestic smoke control policies depended. As gas coke production diminished and eventually disappeared, production of alternative manufactured smokeless fuels was increased but never in sufficient quantity to make up the shortfall. Fortunately, after some initial uncertainties North Sea gas came on stream in sufficient quantity to maintain the impetus of smoke control. The grant arrangements were changed and as the nineteen sixties drew to a close, the market share of the various smokeless fuel replacements in Smoke Control Areas became 3 to 1 in favour of natural gas. As this trend asserted itself the first significant improvements in air quality became apparent. By 1968 smoke concentrations in towns and cities pursuing active smoke control policies had reduced by 50 per cent and SO_2 by 30 per cent compared with the values measured 10 years previously. The trends progressed to the achievement of the air quality standards taken so much for granted today.

Industrial fuel patterns were no less affected by these influences. In many industrial cities the installation of new coal-burning plant reduced dramatically, and in some, became a rarity.

ENVIRONMENTAL CONSEQUENCES OF INCREASED COAL-BURN

It may be that the improvements in air quality which we now inherit would have been brought about without the impetus of the Clean Air Act and Smoke Control Areas. Nevertheless, the 5,600+ Smoke Control Areas in the United Kingdom provide some means of exercising control to minimise the impact of progressive increases in coal burn. Despite the hiatus caused by the world recession there is no doubt that coal will reassert itself as the nation's primary energy resource and the benefits which have accrued from the predominance of oil and gas over the past 20 years will be gradually eroded. It is therefore essential that every means available to control air pollution be examined and applied with renewed vigour.

Current experience suggests that existing controls will be inadequate to the task. Clean Air is now largely taken for granted. Reversion to domestic coal burning in Smoke Control Areas is widespread. Despite the effects of recession on industrial activity, compliance with the EEC Air Quality Directive is barely being achieved. In Sheffield for example, of the five monitoring stations in the City two have been identified as approaching breaches of the standards. A recent survey conducted by South Yorkshire County Council indicated widespread difficulty in meeting the Directive in South Yorkshire.

A significant proportion of the Sheffield pollution control resource is committed to policing Smoke Control Areas and only by regular surveillance is the problem being contained, but not resolved. Sheffield cannot afford any increase in smoke and SO_2 emission, be it from domestic or industrial sources. The comment of the Flowers Commission in its report on Coal and the Environment that the application of satisfactory techniques (for coal burning) is in the best interests of the National Coal Board is most apposite. It is in the best interests of us all.

The examination of the techniques which are available does not, at first glance, engender confidence that they can meet today's necessarily stringent requirements. Industrial and commercial boiler use was identified by the Commission as an area for significant changeover to coal. The design of boilers and that of the coal firing equipment intended for them appears to have changed very little from the most advanced developments of 20 years ago. Such plant depended very heavily on the "permitted periods" of smoke emission allowed by the Clean Air Regulations. The attention of skilled operators was also essential. Fluid bed combustion is a notable advance in combustion technique and is certainly capable of virtually smokeless operation but it does require high efficiency grit arrestment which is expensive to install and maintain.

One recalls the particular problems of controlling smoke emissions from brick kilns and those from metal and chemical industries, all identified by the Flowers Commission as areas where a switchback to coal has commenced and will progressively increase. What new developments in firing and control will avoid the recurrence of past problems from these sources?

In the domestic field considerable research, particularly by the National Coal Board, is being pursued to achieve smokeless coal burning in home heating appliances. Past experience of so-called "smoke eating" appliances does not encourage the belief that they can operate continuously in an average domestic environment with a smoke emission not exceeding that of solid smokeless fuel. The National Coal Board apparently looks to these developments to arrest falling sales of house coal. In view of the rosy prospects for coal, why cannot the domestic market be totally relinquished to solid smokeless fuels and premium fuels such as gas?

It is perhaps surprising that after 20 years of the most stringent competition to maintain a foothold in the energy market, the National Coal Board and the coal conversion industry have not researched more revolutionary and innovatory concepts of coal utilisation rather than relying on traditional techniques of burning coal on a grate or in a retort. Nevertheless, it is recognised that those techniques have been refined to a degree that enables them to operate smokelessly, at least under laboratory test conditions. The real test of universal practical operation in industrial and, where appropriate, domestic applications has yet to be made. It is certainly in the best interests of the National Coal Board and the users to ensure that economic pressures do not cause either to retreat from meticulous adherence to those techniques. Failure to do so will undoubtedly have a deleterious effect on air quality standards and the community.

CONTROLS

The Flowers Report pinpoints a weakness of the existing pollution control system (legal controls) as the inability of local authorities to act in anticipation of possible pollution problems, other than through planning controls. It also refers to the cumulative effect of individual emissions which, although complying individually with legal standards, could aggregate to cause breaches of the EEC Air Quality Directive. The report

concluded, however, that the Directive provides an adequate standard for the protection of human health and that existing legislative powers are sufficient for the control of pollution from coal combustion residues in urban areas.

There is no doubt that anticipatory powers need to be strengthened. Whilst accepting the inevitability of coal as the primary energy source, circumstances will arise where the imposition of an added emission from a proposed coal burning plant on ambient concentrations of pollutants will be unacceptable. In such cases there must be powers for local authorities to regulate the fuels to be used. It is essential that details of the proposed plant are submitted for approval at the earliest planning stage. Existing prior approval powers need to be extended to enable local authorities to withhold approval of a proposed fuel burning installation until they are satisfied that the proposed fuel will not cause the EEC Directive to be breached.

The Dark Smoke (Permitted Periods) Regulations were made by the then Minister of Housing and Local Government on 24th March 1958 — twenty-five years ago. As the name implies, the regulations are concerned with the amount of smoke which may be emitted, no less than with the control of smoke emission. This philosophy has, over the years, given rise to extensive debate between embattled plant engineers on the one hand and enforcement officers on the other, on the question of whether a chimney has or has not breached the regulations. The arguments of each protagonist have been further extended by their individual assessments of the shade of smoke being emitted. The inexact nature of the regulations has, over the period of a quarter of a century, given rise to interpretations and the definition of terms which vary according to the particular viewpoint. The term "smokeless" for example, as defined by an enforcement officer means "the absence of smoke". To a plant engineer, or a technical representative engaged in selling or supervising the installation of plant, or even some scientists engaged in developing new techniques of coal burning, "smokeless" means "capable of operating within the Permitted Periods Regulations". With the predominance of gas and oil as industrial fuels such arguments became less relevant. It is still a fact, however, that discussion between local authority officers and those concerned with the installation of new coal burning plant starts with the assumption that smoke will be emitted, and the main point of contention is how much or how little will be acceptable.

In the closing decades of the twentieth century, the technological advances in coal conversion must render obsolete the philosophy of allowing any smoke emission to be legally acceptable, making arguments on the definition of "smokeless" irrelevant.

Thus, the Dark Smoke (Permitted Periods) Regulations can be repealed and replaced by regulations which prohibit any smoke emission other than that caused by unavoidable breakdown of plant or equipment or other circumstances which could not reasonably have been anticipated.

The vexatious problem of widespread availability and use of house coal in long established smoke control areas poses serious problems for many local authorities intent on meeting the EEC Air Quality Directive. Existing controls are quite stringent but depend

on the ability of local authorities to exercise constant policing and surveillance. Few, if any, councils have the resources to do this effectively. Coal can be sold openly from any retail outlet located within a Smoke Control Area without infringing the law and such sales add to the problem of effective control. The vigorous promotion of COAL as a house fuel encourages the belief that it is acceptable anywhere, operative smoke control included.

Arguments for tighter controls over those who retail coal in smoke control areas are countered by protestations that such controls would unreasonably restrict the freedom to sell to persons who may not be governed by smoke control orders. Those who promote coal responded dismissively to requests that the advertisements should be aimed more selectively and make clear distinction between coal and solid smokeless fuels.

These attitudes ignore the real concern felt by local authorities that progressive and enlightened Clean Air policies vigorously pursued over many years at considerable cost and the obvious benefits which have resulted from them, should not be jeopardised.

Following other legal precedents, it is not unreasonable that the law should be strengthened to enable local authorities who have completed Smoke Control Programmes which cover the whole of their area to seek Designation, whereby the sale of coal by retail anywhere within the council's district is prohibited.

Nor is it unreasonable to expect coal marketing and distribution industries to temper their natural and proper promotional vigour with equally proper and needful regard for environmental considerations.

The debate on long range transportation of SO₂ emissions and the effect on the acidity of rainfall in other European countries is gaining momentum. International criticism of United Kingdom air pollution control policies is mounting and it remains to be seen how those policies will be affected. A well orchestrated, sedulous propaganda campaign, such as that pursued with regard to lead in petrol, could influence opinion to an extent which would require governmental response. It might eventually be necessary for the coal conversion industry to conduct a reappraisal of the technology available to utilise coal with minimum environmental input.

Perhaps then the centuries old practice of burning it will become obsolete.

CONCLUSION

The Flowers report refers to the likelihood of oil and gas supplies remaining stable throughout the 1980's, providing the opportunity for a gradual transition to coal to be accomplished. In the event of some sign that the recession will ease, market response may accelerate the transition and the benefits of a gradual switchback to coal will be denied us. That being so, it is imperative that the attitudes of all concerned with the re-establishment of coal as the primary energy source are attuned to the needs of the environment. The consequences of an approach to coal utilisation which is not sensitive to the real risks of serious erosion of the hard won amenity of Clean Air could be disastrous. It behoves all concerned — coal marketing, distribution and utilisation interests, industrial, commercial or domestic users and the enforcement agencies — to ensure that the bounty embodied in vast coal reserves is not exploited, as in the past, without regard to the maintenance of high standards of air quality.

THE A.C.M.S. AND CLEAN AIR

by

J.F. Brown

National Secretary, A.C.M.S.

The concern of the Approved Coal Merchants Scheme is the raising of standards of trading among Coal Merchants and the protection of customers by means of conditions of membership which ensure good and reliable service. It follows that problems that may arise are promptly and sympathetically dealt with. The standards that we look for call upon members to identify themselves properly on vehicles, on premises, on paper work such as delivery tickets and in advertisements. Equally they are required to identify properly the fuel that they are selling.

One of the basic conditions of membership refers to the law relating to Clean Air. This requires members to take all reasonable and proper steps, including proper supervision of and instruction to the trader's staff, or Contractor's who may be delivering on their behalf, to avoid committing any criminal offence involving dishonesty or relating to Weights and Measures, Trade Descriptions, Smoke Control, or Fair Trading law. This condition is well known to all members, and should a member be found to have suffered a conviction, either directly himself or through the actions of employees or contractors, for any of the offences mentioned, he knows that it is the Scheme's duty to call him before a meeting of the Regional Committee who could, if the offence or offences were sufficiently serious, expel him from the Scheme.

Applicants for membership of the Scheme are carefully examined by Regional Committees (called Regional Panels) who are charged with the duty to ensure that only those with a reasonable basic knowledge of coal trade matters are accepted into membership. The Scheme rules clearly spell out that to be successful, any applicant must know about Clean Air legislation so far as it affects the delivery of solid fuel, and must know about any Smoke Control areas in his proposed trading area.

The Solid Fuel Advisory Service runs a two day course for people new to the Coal Trade. These might be new recruits for Coal Merchants businesses, such as sales ladies or lorry drivers, or might be people who are setting up or buying coal businesses. Being a basic course, it includes discussion about Weights and Measures legislation, Trades Description and, obviously, Clean Air. Brief mention will be made on this course of those appliances which are designed to burn bituminous coal smokelessly and are approved for use in Smoke Control areas. These appliances receive more detailed examination during the five day course, usually residential, which the SFAS runs for those who wish to qualify for a Certificate of Proficiency. The significance of this certificate will be recognised when one appreciates that a Coal Trading firm cannot become a Diploma Coal Merchant without at least one member of staff holding such a certificate. The emphasis on this course and the two day course is on the correct choice of fuels for modern appliances and warnings are always given of the serious consequences which can arise

when incorrect fuels are used. Once qualified, Certificate of Proficiency holders are asked to attend refresher courses at least once every three years. These courses are designed to bring those attending up to date with developments in appliances, fuels, equipment and changes in laws affecting Solid Fuel retailing. Any developments in Clean Air legislation or the creation of Smoke Control areas would be covered.

Alongside the Approved Coal Merchants Scheme there runs the Approved Solid Fuel Packers Scheme. The aims of this Scheme are to raise the standards of those packing Solid Fuel in sealed containers, both as to storage and handling of fuel and in the way the packs are presented. The Scheme's conditions of membership provide protection for customers who buy these 'pre-packs' from a wide selection of retail outlets. They call upon the Packer to ensure that the fuel is packed in a satisfactory condition and that the quality indication and producers' descriptions of the fuel are clearly marked on the pack. The Packer must identify himself and show the Scheme sign. Of importance to users is the requirement that all packs should say whether or not the fuel is authorised for use in Smoke Control areas.

Applicants for membership of this Scheme are interviewed in much the same way as ACMS applicants, and it is by no means automatic that a Coal Merchant who has a mind to take up pre-packing is granted Packers Scheme membership.

We have discovered that nearly all Packers lay the filled pack flat, often on pallets for lifting on to lorries with a fork lift truck. Wishing to make the message about approval, or otherwise, for use in Smoke Control areas obvious, they have this printed low down at the bottom of the pack, where it stands out well. However, many retailers display packs of solid fuel standing upright so that the bag designs show up well, and in these circumstances the approval message is not so obvious. We are asking packers and bag manufacturers to print the message so that it is clearly seen when the pack stands upright, and while it will take some while to achieve this (Packers buy bags in bulk, sometimes 12 months in advance) there is already an improvement.

DIVISIONAL NEWS

SOUTH WEST DIVISION

"A Sense of Pollution" – ONE-DAY SEMINAR

Report by Hylton Dawson, Vice Chairman, NSCA South West Division.

On Tuesday 29th March 1983 at the University of Bath the South West Division organised a one-day seminar on "A Sense of Pollution". The event was attended by approximately 100 people and the day, under the Chairmanship of *Air Commodore J. Langston*, Secretary General of the National Society for Clean Air, was a resounding success.

THE VISIBLE EFFECTS

Bob Jarman (C.E.G.B.), in a wide ranging and controversial presentation, covered visible effects of smoke plumes from sources such as power stations, industrial plant, bonfires and stubble burning. Methods of controlling visible plume were explained. The speaker then covered the question of fallout from such emissions including soot, ash and acid. Further evidence of the effects of pollution comes from the way it attacks paintwork and building structures and the speaker surprised many people by pointing out just how many and varied the visible effects of pollution can be!

THE ODOUROUS EFFECTS

Dr. R.L. Moss (Warren Spring Laboratory) explained that the question of odour control was extremely complex. Atmospheric standards to safeguard health are defined by threshold limit values, usually specifying maximum pollution levels in parts per million. But because the human nose is so sensitive, thresholds of odour detection are defined in parts per billion! Therefore, engineering for control could be extremely difficult. The main factors in determining the acceptability of an odour were:

- Intensity** — in terms of its presence in the atmosphere;
- Character** — which makes it recognisable or not;
- Hedonic tone** — which is a somewhat esoteric term to describe whether an odour is pleasant or unpleasant;
- Frequency of occurrence** and the **duration** of each incident.

Various methods of scientifically ranking odour were described and the speaker explained that these data could then be used to define standards of acceptable control.

The only options in odour reduction are to

- change the process
- dilute the odour in the atmosphere (bearing in mind that the dilution factor is certainly millions and possibly billions-to-one!)
- treat the odour before discharge to atmosphere or modify it by masking with a more pleasant odour.

The topic of odour control triggered a lively discussion on the widespread problems of odour and the fearsome difficulties of control.

THE AUDITORY EFFECTS

Hylton Dawson (Rolls Royce Ltd.) told the delegates that although the auditory effects of noise pollution have been well recorded since biblical times, current standards and practice in its control leave much to be desired.

The control of noise was a topic too wide ranging and important to be left to the experts. Lay people should be encouraged to do more both to prevent undue noise and to ensure that any unacceptably noisy activities were controlled either by technical

or social means. Uncontrolled noise can give rise to a wide range of auditory physiological and social effects.

Topics of concern which could be dealt with by the National Society include:

Low Frequency Noise

The din from refrigerated lorries

Silencing and considerate use of noisy motor-cycles

Public education in the field of "personal pollution" such as youngsters impairing their hearing by too much exposure to disco-din or assaulting their ears with the noise from headphones replaying pop music of high intensity.

In a spirited debate, the delegates made it clear that the National Society should vigorously press and indeed demonstrate action on these topics.

EFFECTIVE CONTROL (I)

Mr. J.E. Colehan (Industrial Air Pollution Inspectorate) showed before-and-after situations in pollution control. He made it clear that the Clean Air Act was one of the most effective pieces of legislation ever passed and he showed situations where almost literally dark satanic areas had been transformed to virtually green and pleasant land. Chimney emissions, dust from quarrying, smoke from tyre burning and chemical disposal, were only some of the situations covered; the speaker also showed examples of mal-practice in straw and stubble burning. Delegates were left in no doubt that, though largely unsung, the Alkali (Industrial Air Pollution) Inspectorate was a very necessary and effective force.

EFFECTIVE CONTROL (II)

Mr. D.A. Lovell (Poole B.C.) gave a wide ranging dissertation on the legal controls available for dealing with all the types of pollution which had been discussed during the Seminar. In every case he illustrated the cold legal situation with fascinating examples of both case-law and problems drawn from his own experience. Delegates were given a revealing insight of what it was like to be an Environmental Health Officer at the sharp end of pollution control. Bearing in mind the countervailing social, economic, political and fiscal forces involved, the law was often inadequate.

CONCLUSION

In formally closing the meeting, *Mr. W.B. Twyford*, Chairman of the Council of the National Society for Clean Air, thanked the South West Division for inviting him. He had been honoured to attend the Seminar and was impressed by the welcome he had received. Having come fresh from a 2-day NSCA Workshop in Sheffield, he noted that the pollution problems considered of vital importance in the industrial heartland of Britain were ranked equally in the idyllic City of Bath. The debate in both cases had shown that the policy and objectives of the National Society were largely correct and

he was delighted to see the momentum being maintained. He felt sure that delegates would go away recharged by what they had heard at the Seminar and would continue the good work.

SPONSORSHIP

This event would not have been possible without the goodwill of those commercial undertakings who acted as Sponsors and who also exhibited their scientific and technical apparatus.

The sponsoring organisations were:

- Bristol Industrial & Research Associates Limited
- Bruel & Kjaer (UK) Limited
- Casella London Limited
- Central Electricity Generating Board
- Computer Engineering Limited
- Quality Environment Limited
- Rigidon (UK) Limited
- Techmation Limited

EAST MIDLANDS DIVISION

More than sixty members of the Division gathered in Lincoln on the morning of Thursday, 24th March 1983 and, contrary to usual practice, did not assemble in one place but went to pre-arranged visits. These were at three factories, namely the Smith Clayton Forge, Robeys of Lincoln and Ruston Gas Turbines. I can only speak personally for the Smith Clayton Forge which I visited. In one and a half hours, my concept of what happens at a forge and what can be produced by that process was very greatly updated. There, too, visitors saw the semi-automated forging complex known as the Screw Press Project, of which the centrepiece is a 16,000 tonne Weingarten Percussion Screw Press, so huge that its four upright corner bolts each weigh nineteen tons. Those who went on the other visits were equally impressed with the production lines of the factories.

At 12.30 pm, we were scheduled to meet together at the City Hall in Lincoln and here we were given a Civic Welcome by the Mayor of Lincoln, Councillor C.A. North, and then entertained to an excellent lunch by kind invitation of the Mayor and Councillors of the City of Lincoln.

At 2.00 pm, members assembled in Committee Rooms 2 and 3, under the Chairmanship of Councillor Mrs. E.J. Inglefield. Mrs. Inglefield first thanked the Mayor and City Council of Lincoln for inviting us to their City and for the accommodation and hospitality which they had so kindly provided. The Chairman also made reference to the fact that for some Councillors it would be their last meeting since they were not

standing for re-election to their authorities and thanked them for their support. Mrs. Inglefield also thanked the Companies who had so kindly received us for visits in the morning. A short business meeting then ensued, after which the Chairman introduced Mr. John A. Sandy, CEng, MIMechE, Sales Director of Robey of Lincoln Ltd., who gave a presentation, illustrated by slides, of the firm's various products. This was followed by a similar presentation by Mr. Colin E. Richardson of Tollemache on modern methods of waste disposal. During the discussion session, the two speakers were assisted by Mr. J. Willerton, CEng, MInstF, The Chief Engineer of Robeys Ltd.

Closing the meeting, the Chairman thanked Mr. Sandy, Mr. Richardson and Mr. Willerton for their efforts on behalf of the Division.

E.F. Raven
Hon. Secretary

NORTHERN DIVISION

Mr. W.C.B. (Charles) Robson, Borough Environmental Health Officer, Darlington BC, has been confirmed as Hon. Secretary of the Northern Division, in succession to Colin Cresswell. Mr. Robson has also been elected the Division's representative on the Society's National Council.

Those wishing to contact Mr. Robson, and through him the Northern Division, should

write to: Mr. W.C.B. Robson,
Borough Environmental Health Officer,
Town Hall,
Darlington,
Co. Durham DL1 5SU.

or telephone Darlington 60651.

FULGORA SLOW COMBUSTION STOVE

Mr. F. Reynolds, Director of Environmental Health, Leeds City Council, has written to the Society's Secretary General seeking corroborative evidence from other local authorities on problems created by the Fulgora appliance. We reproduce the text of his letter here, and would ask anyone who can help to contact Mr. Reynolds, or Mr. M.J. Gittins, at Leeds City Council, Tel: (0532) 463472.

"For some years a fireplace known as the Fulgora Slow Combustion Stove has been classed as an exempted fireplace under a statutory instrument made under provisions of the Clean Air Act 1956. The effect of this order is to enable these units to be operated within smoke control areas, regardless of the amount of smoke which they produce, provided that they only burn wood waste in a clean condition.

This Department is aware of several of these stoves which when operated have produced

such copious volumes of smoke as to cause local residents to complain of nuisance. Tests carried out by Warren Spring Laboratory confirm that in its present form the appliance is unlikely to be able to burn wood waste smokelessly except with sawdust at the maximum burning rate. The Department of the Environment, however, seem reluctant to take any positive action in relation to these appliances because they say some 5,000 to 7,000 have been installed within the United Kingdom during the last 23 years without having given rise to complaint. Although somewhat surprised by this statement, the apparent lack of corroborative evidence from other local authorities does seem to weaken any case which Leeds may wish to develop for a modification in existing legislation."

RECLAIMING CONTAMINATED LAND

The British Standards Institution has drawn up a new code of practice of great importance to those involved in the reclamation of land contaminated by industrial or other activities. Details were announced by Mr David Lord, chairman of the relevant BSI committee, when he addressed delegates at an international land reclamation conference in Grays Civic Hall, Essex. The draft document is to be issued for public comment this summer (1983).

The new code deals with the investigation of sites affected by many different types of contamination such as that associated with iron and steel manufacturing, oil refineries, tanneries, sewage works, chemical processing, coal yards, waste tips and other sources of pollution. Comprehensive guidance is given on how to assess the need for an investigation, its planning and execution and the means of determining the extent of contamination on a particular site. The methods described are designed to produce adequate information on which to base remedial or protective measures for site redevelopment, due attention also being given to the safety of personnel carrying out this work.

A feature of the code is its multi-disciplinary approach, which reflects the complexity and range of the technical and other problems that are likely to arise. It is therefore written to accommodate the needs of experts in various fields, e.g. engineers, architects, chemists etc. Included in the code is a diagram depicting the sequence of essential operations from the decision stage through to the assessment of final results. The draft is to be published as *Draft British Standard code of practice for the identification and investigation of contaminated land*.

MEASUREMENT OF AIR POLLUTION

BSI have published *BS 1747: Part 6: 1983: Methods for the Measurement of Air Pollution — Sampling equipment used for the determination of gaseous sulphur compounds in ambient air*. It is identical with ISO 4219-1979 'Air quality — Determination of gaseous sulphur compounds in ambient air — Sampling equipment', and is one of a series relating to air quality arising from UK participation in the work of ISO/TC 146. Methods for the determination of particular constituents of ambient air will be published as further Parts of the standard. Topics relating to air quality characteristics will be published as Parts of BS 6069 'Methods for characterisation of air quality'.

PILOT'S LICENCE

There I was — steeping in a nice hot bath — quietly contemplating Pollution Paper No. 18 (the Government's response to the 5th Report of the Royal Commission on Environmental Pollution) when, quite suddenly, a curious rippling affected my vision. When I was able to refocus I became aware of a small figure standing on the edge of the tub. Immaculately dressed in bowler, black jacket and pin-striped trousers, with a tiny briefcase in one hand and a similarly tiny umbrella in the other, he looked the epitome of a little Sir Humphrey just emerged from the latest edition of BBC's "Yes, Minister!"

"Good gracious" said I, "Who are you, where on earth did you spring from — and what do you want?"

"My dear, dear fellow" said he "surely you must recognise me Sir Pongphrey the Permanently Desirable Under-Magician of Marsham Street. I gathered from the telepathiser that there was an old ACAI protagonist about to be stupified by PP18 so I transferred across at once. Clearly I was none too soon why, another minute and I would have been lucky to find even a few bubbles! We could not afford to have you sunk by PP18 could we? That sort of publicity would be most undesirable! You must understand" he added "that it is my job to see that its more controversial decisions are filed and forgotten as quickly as possible. So, please don't thank me for saving you — it is just another aspect of our Health and Safety strategy". Then, deftly flicking the Sudsey into the water with the tip of his magic broly he swung at my head with his little briefcase — and I realised that I was in for that mixture of soft soap and heavy massage treatment unique to Whitehall master panjandra (or is it drums?)

"My dear, dear boy" he went on, "you must appreciate that our Departmental policy for PP18 has been to promote it as a non-event — which is not all that easy what with you Clean Air chappies and the CBI and the IEHOs and a lot from both Houses continually nagging us about returning the Alkali Inspectorate to the Department. Really, the whole idea is absolutely preposterous! What made things worse is that the Royal Commission even had the Minister believing all that closely argued guff in Chapter 8. Why, he is on record in the House for having pressed his predecessor to make the same move. So my first task was to get the Minister to make a U-turn — and you know how popular those are with the PM!"

"My goodness" I said, "What a truly formidable obstacle. How on earth did you get over it? Clearly, you must have invoked some extremely powerful anti-logic magic". This appeared to please Sir Pongphrey. With a quick upward twizzle he flew over to the hot tap and settled himself comfortably.

"Oh, it wasn't all that difficult", he went on (rather smugly I thought), "I had already had three years' practice disabusing his predecessor of the same idea and the key features

of my campaign were well established. Nevertheless, some of my colleagues are still not entirely sure that I have finally won the battle as they are most unhappy about that Memorandum of Understanding tacked on at the end of PP18 and also that bit about the Government keeping an open mind. They look on both as sure signs of a Ministerial guilty conscience. For my own part" he went on, "I don't agree. Effective politicians (and Government has to govern you know!) invariably salve their consciences with the unction of best practicable inter-departmental compromise. So all we have to do is to live down the Memorandum for a few years while we get the Alkali Inspectorate so enmeshed with the Factory gang that no-one will have the time, money or the will to do anything about it. And by then we will have trained a new generation of HSE orientated inspectors with a vested interest in maintaining the status quo. In the meantime" Sir Pongphrey continued "all I have to do is to contain the situation by denying clean air nutters like you the opportunities to make public nuisances of yourselves."

"Would you mind", I said, deliberately emphasising each word, "turning around a few times? The water is getting a bit cold — and I would be fascinated to hear how you finally managed to suppress those Ministerial scruples."

Turning first one way and then the other, he topped-up the tub. "That alright, dear boy? Splendid! I'd be delighted to tell you about that U-turn — brilliantly achieved if you will permit me to say so — and immensely satisfying. We used all the standard ploys: concentrated on key targets; fought on ground of our own choosing; drummed up support from every likely ally; and from time to time introduced a few flanking movements to confuse the situation and maintain a high level of Ministerial stress. All pure Clausewitz. The primary target — that recommendation to set up a centralised HM Pollution Inspectorate for England and Wales to implement the concept of 'best practicable environmental option' — was obvious. We felt that if we could demolish that one first, we should not have too much trouble disposing of the other recommendation to return ACAI to the Department. Moreover, HMPI guaranteed us a host of allies — all those authorities presently responsible for pollution control which would be likely to lose sovereignty as a result of it, plus all those on the staff side who naturally object to change. It all worked like a charm. The various agencies and associations rallied to the cause and we knew that given enough time all those Ministerial scruples would wither away. Firstly, we gave ground by permitting the Minister to accept the logic of BPEO. Then we stood firm by showing how un-English it would be to adopt the same sort of organisation to enforce it which works so well in Scotland. Why, that would be worse than losing the Calcutta Cup again — as well as send entirely the wrong message to the Arms Park! Anyhow, why go to all that trouble and expense when a simple system of consultation and the good will of men would allow us to muddle along in the best Whitehall tradition? But, of course, the outcome was never in doubt".

"After that", Sir Pongphrey continued, "the rest was a doddle. A paper was tabled in the library of the House of Commons explaining exactly how we intended to cement ACAI into the HSE for ever. That was a ploy of truly machiavellian proportions — since not even the Minister could imagine that anyone with even the merest understanding of the fundamentals of leadership and control, would ever believe that a paper calling for

the introduction of ‘matrix management’ was intended to be taken seriously! Really, we were quite astonished to get that letter signed by the President of the CBI, the President of the National Society for Clean Air and the President of the Institution of Environmental Health Officers demonstrating that we had been rumbled! Well, you can’t win them all! However, we decided to ‘out stare’ them by holding up PP18 for another 18 months and, in the meantime we have been quietly going along with the restructuring of HSE. Once they establish a common set of boundaries for the various inspectorates they will be in a position to superimpose a common hierarchy to enable that tidy mindedness beloved by every administrator worthy of his salt to have triumphed again.”

“My word,” said Sir Pongphrey “that was a bit of a long speech for me, but I wanted to make sure that you fully appreciated what a remarkably negative document PP18 is”.

“Pon my soul,” I said, “it truly is. I am most grateful for the explanation – and I would also like you to know how grateful I am to you for one of its more positive features. Do you know, I think that it will help to keep me busy for at least the next few years!”

Sir Pongphrey fixed me with a beady eye. “It’s time you woke up,” he said. Reaching down, he pulled out the plug and disappeared.

J.L.

LETTER TO THE EDITOR

Dear Madam,

Table Showing Cold Blast Cupolas operating in West Midlands Vol. 12 No. 4 Clean Air – Page 129

I refer to the above-mentioned table and wish to correct the figures shown for Sandwell. These should be as follows:—

	Iron foundries	Cupola Units	Closures (80-81)	Melt Rate (ton/hour)		
				3	3-10	10+
Sandwell	33	66	7	15	45	6
Revised totals	87	159	19	28	105	26

Since this table was published six further iron-foundries have closed in Sandwell.

Yours faithfully,

S.W. Hogg

*Director of Environmental Health
Metropolitan Borough of Sandwell*

SMOKE CONTROL

The Department of the Environment has written to all local authorities who submitted programmes for 1983/84 notifying them of their allocations. All programmes submitted have been approved in full and the schedule of figures for individual authorities is as follows:

CLEAN AIR ACT 1956

EXCHEQUER CONTRIBUTION TO SMOKE CONTROL ORDERS 1983/84

(All programmes submitted have been approved in full)

Region and Local Authority	£ Amount	Region and Local authority	£ Amount
<i>Northern</i>		<i>West Midlands</i>	
Darlington	6,857	Birmingham	78,857
Gateshead	68,740	Coventry	55,744
Langbaugh	28,000	Dudley	28,500
South Tyneside	9,380	Lichfield	16,000
Stockton-on-Tees	166,000	Newcastle Under Lyme	14,000
		North Warwickshire	13,485
		Nuneaton	18,541
<i>North West</i>		East Staffordshire	20,554
Blackburn	24,672	Staffordshire Moorlands	10,000
Bolton	38,857	Stoke on Trent	136,511
Chorley	8,170	Walsall	154,400
Liverpool	116,570	Warwick	5,714
Manchester	9,786	Wolverhampton	65,000
Oldham	27,028	Worcester	28,000
Preston	6,143		
Rochdale	53,100	<i>East Midlands</i>	
Rossendale	12,500	Ashfield	27,639
St. Helens	28,570	Bassetlaw	12,572
South Ribble	14,400	Blaby	9,429
Stockport	22,857	Broxtowe	13,200
Wigan	94,480	Chesterfield	30,888
Wirral	73,000	Derby	55,920
		Erewash	5,343
<i>Yorkshire and Humberside</i>		Gedling	8,837
Barnsley	70,588	High Peak	28,657
Doncaster	419,496	Lincoln	20,000
Harrogate	20,554	Mansfield	74,000
Kirklees	295,609	Newark	13,470
Rotherham	106,571	Nottingham	40,814
Selby	48,857	Rushcliffe	20,292
		South Kesteven	3,389

Region and Local authority	£ Amount	Region and Local Authority	£ Amount
<i>South West</i>		<i>South East</i>	
Bath	9,501	Broxbourne	6,720
Bristol	98,090	Gravesham	1,840
<i>Eastern</i>		North Bedfordshire	6,724
Peterborough	5,689	Oxford	6,912
<i>Greater London Area</i>		Portsmouth	9,100
Barking	36,055	Slough	2,875

There has been one further change to the criteria in paragraph 10 of circular 11/81. The average cost per dwelling figures for the higher cost regions in the Midlands and North have been revised upwards so that overall only the exceptionally expensive smoke control orders need be referred to us for specific approval in principle. The new figures are:—

Northern and Yorkshire Humberside regions	£350
North West and East Midlands regions	£275
West Midlands regions	£250
Elsewhere	£200

EXEMPTED FIREPLACES

Two more fireplaces have been exempted from the provisions of section 11 of the Clean Air Act 1956. SI 1983 No. 277, which came into operation 2nd April 1983, exempts the Rayburn Coalglo C-30, manufactured as both an inset and a free-standing model by Glynwed Domestic and Heating Appliances Ltd. The SI also revokes the Smoke Control (Exempted Fireplaces) Order 1981(c).

SI 1983 No 426 exempts the Talbott 500 Hot-air Heater (afterburn model) manufactured by Talbott's Heating Limited.

FUTURE EVENT

May 28 - June 1 1984 — 13th AICB (International Association Against Noise) Congress.
Sarajevo, Yugoslavia. Theme: "25 Years of International Collaboration and Experience in Noise Control". Those interested should contact Jane Dunmore at the National Society for Clean Air, Brighton.

INDUSTRIAL NEWS

Rubbish — A New Field for Gas Detectors

There is a two-fold need to detect and measure the presence of Methane, which is an inevitable by-product of decomposing refuse at landfill sites. First is the environmental reason of ensuring that gas levels do not become unpleasant, or, at worst, an explosive hazard — particularly important where the sites may be near residential or industrial premises. Secondly, pioneering work on the reclamation of the Methane indicates that under the right conditions it can be a viable source of 'free' energy.

Crowcon Instruments of Oxford, a leading UK specialist in gas detection equipment, has been co-operating with several companies involved in this field — both on site management and control, and with consultancies concerned with development projects.

A notable example is at Judkins Quarry near Nuneaton in Warwickshire. Owned and operated today by ARC (Amey Roadstone Corporation), quarrying has been in progress at this 190 acre site for over 130 years. The present extraction area for stone covers about 50 acres, but an exhausted 10 acres is already well advanced as a landfill site, and another 20 acres will soon be added to this.

Judkins' is thought to be an ideal site for gas reclamation, because of its compact surface area relative to its substantial depth — about 100 metres. The site receives about 150,000 tons of rubbish a year from Warwickshire and surrounding areas and is one of several under the supervision of Mr. Paul Tomes, Landfill Manager for ARC's Western Region. Mr. Tomes has the overall responsibility for landfill operations within Western region, as well as for imple-

menting ARC's strict control of associated environmental factors.



As part of this work Mr. Tomes, for the past three years, has been carrying out monitoring with a Crowcon 'Gasranger' instrument. This is a portable unit, powered by rechargeable batteries, designed specifically for natural gas (Methane) and having two distinct measurement ranges: a high-sensitivity range to indicate 0 - 100 per cent LEL (lower explosive limit) of Methane (5.3 per cent by volume in air) for use as a safety check for an explosive hazard; and a range giving 0 - 100 per cent Methane by volume in air or in another background gas such as Nitrogen. This latter range can be used to help determine the quantity of the gas.

At Judkins Quarry, the sensitive LEL range is used with a sampling hose and

aspirator to check for any hazardous build-up of gas at 80 metre deep bore holes on the site perimeter. The second range is used to sample the volume of gas venting through eight, 30 metre deep, gas 'collecting' bore holes in the heart of the site. These readings give a fairly accurate indication of the proportion of Methane in the complex background atmosphere of air and other gases — notably carbon dioxide — emanating from the site.

So far, says Mr. Tomes, the instrument has performed satisfactorily in both its roles: indicating an absence of gas outside the site, and a level of gas within the landfill itself of around 50 per cent by volume — confirming theoretical calculations. It is thought that at this level, properly harnessed and processed, gas from the site could in due course satisfy a substantial part of the total energy needs of Judkins Quarry and its associated coating plant.

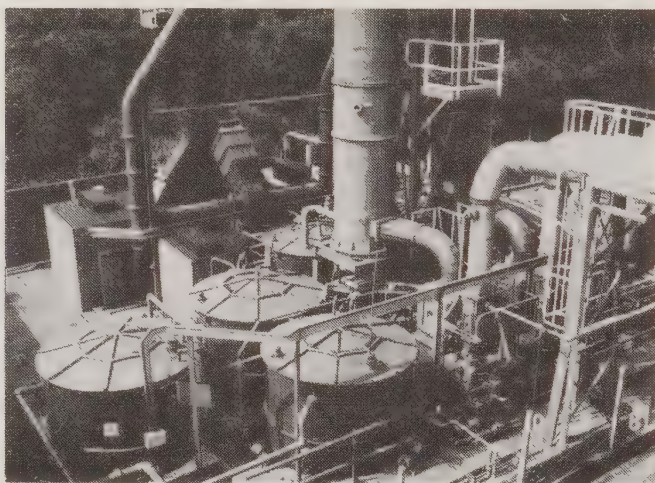
Clearly, the precise analysis of gas content is a matter for more sophisticated and costly work in the laboratory, but Crowcon believe that because of its portability and ease of use the Gasranger is becoming a valuable 'tool' for regular field checks on landfill sites around the country.

Reader Enquiry Service No. 8312

Noise Level Reductions at New Chemical Treatment Plant

Work carried out by Alpha Acoustics Limited, High Wycombe, Bucks., to reduce noise levels of a new chemical treatment plant operating at Union Carbide's Carbon Products Division's plant near Sheffield, has been complimented by the local Environmental Health Officer. The plant is used to extract acidic fumes from the factory, clean them to an acceptable level

and then discharge them to the atmosphere. Two high volume fans extract the fumes through separate streams, each one removing approx. 800 cubic metres of fume per hour. A third fan is available on standby.



Originally, special silencers, manufactured from polypropylene with a mineral fibre sound absorption section, were supplied for use on the discharge of the extractor fans. In the majority of applications these silencers would remain effective for many years without maintenance. Within weeks, however, it became evident that their performance was deteriorating. Tests revealed that the components of the fume were reducing the efficiency of the acoustic packing in the silencer.

An immediate search was made to find an alternative material. After stringent laboratory tests on a variety of fibrous and cellular-based materials, Alpha Acoustics came up with a polyethylene foam which was found to be acceptable. There was still, however, the problem of unacceptable noise levels from the fan and drive motors during start-up of the chemical treatment plant.

As a result, acoustic enclosures and intake silencers were provided for each fan, reducing the noise levels by some 35 to 40

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CLEAN AIR

VOL.13 NO.3





Caring for the environment

The Central Electricity Generating Board has received some 55 Commendations and Awards for environmental schemes at power stations, substations and associated nature trails and field study centres in England and Wales.

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ODOURS AND ENVIRONMENTAL STRESS

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BAN THE BURN

When the Society launched its co-ordinated programme to monitor emissions and effects of straw and stubble burning this year, it did so on the basis of growing concern within the Society about the practice, and the belief that such evidence would be needed to justify demands for stricter controls. Those local authorities who volunteered to take part in the survey were similarly motivated. But this autumn has seen a surge of complaints throughout the country as hundreds of thousands of people have been affected by pollution on an unprecedented scale. The hot dry weather from July through August, followed by high winds soon after many farmers burnt their fields, caused widespread fallout of burnt char and ash. In some cases, farmers have been caught out by the winds which spread flames and burning straw into neighbouring fields and property, devastating hedgerows and putting a considerable strain on fire brigades.

Following publicity about the monitoring programme, the Society has received reports from 23 counties detailing the effects of straw and stubble burning. Most letters and press cuttings mention the fall-out of smuts and char on gardens and paintwork, and their penetration inside homes even when windows were closed. There were also complaints of charry smuts landing in hospitals wards, on sterile equipment, in factories (where they have halted production) and in shops, where they have contaminated goods on display. Some doctors, and many individuals, have commented on adverse effects to health, ranging from the aggravation of existing respiratory conditions, to the production of catarrh and hay-fever-like symptoms in normally healthy people.

As the Society has pointed out, present controls are inadequate to deal with pollution on this scale. The Society has proposed, as an interim measure, that prior approval powers should be given to local authorities to deal with straw and stubble burning; with rigorous conditions attached, farmers would not be able to burn when wind and weather conditions could create immediate smoke and smut problems. The problem of the dispersal of char lifted off fields by wind after the burn would remain, unless farmers were also required, and able, to cultivate the land within 24 hours.

There is only one way of eliminating the pollution caused by straw and stubble burning — and that is to ban the practice altogether. There have been many calls for this measure both from within and outside the Society. In practical terms, a ban would have to be phased-in over a period of a few years, to allow Government and the agricultural industry time to develop alternative markets and uses for straw, organise transportation and central collecting points, and experiment with methods of straw incorporation. Public opinion is in our side and we should not miss this opportunity to press home our thoroughly justified case for new legislation.

THE ROLE OF ECONOMICS IN ASSESSING DESIRABLE AIR QUALITY LEVELS

David PEARCE

*Professor of Political Economy,
University of Aberdeen, Scotland.*

*An Address to 6th World Congress on Air Quality, Palais des Congres,
Paris, France, Friday May 20 1983.*

Introduction

A number of the presentations at this Congress have dealt with the complex issues of estimating the relationship between levels of air pollution and the damage done to society. That damage can take the form of exacerbated or induced ill-health, the corrosion of exposed surfaces (including the deterioration of ancient monuments), the soiling of fabrics and paintwork, the acidification of freshwater sources and the consequent loss of fish and the possible destruction or impairment of vegetation including both commercial crops and natural forests. To these effects we must add the interference to our views of natural landscape through haze and smog — the so-called "aesthetic losses" — and the widely debated impacts of carbon dioxide on the future climate of the earth. We know that the sources of air pollution are many. We also know that the potential effects are numerous.

The question I wish to address, albeit only briefly, is what role has *economics* to play in the procedures we decide to adopt when planning *desirable* levels of air pollution? There is an obvious but not very helpful sense in which the most desirable level of air pollution is zero. Yet we know that this is not a practicable policy objective because it invites us to seek to live in a risk-free society but at a great cost in terms of the resources we must devote to securing that zero risk. Many of our concerned citizens object to the way in which money has to be entered into the equation when we discuss desirable pollution levels. Their concern is understandable, but misplaced. For the inescapable fact is that we live in a finite world in which expenditures in one area of social or environmental policy must necessarily be at the expense of expenditures in another area of policy. Thus, the million pounds we spend on one piece of air quality equipment is one million pounds less to spend on something else. The 'no risk' option is thus not an option at all in the world of practical politics.

But if this is so, then we must have some method, some calculus for saying

just how important our air quality objectives are compared to other policies. Ostensibly, this is where economics comes in, for the economist should be able to tell us what expenditures are worthwhile in terms of the benefits they produce. It is this limited aim I have in mind when I speak of the role of economics. I think we can take individual investments and policies, such as the air quality legislation in many countries, and ask if it has gone too far in legislating against air pollution, or whether it has gone far enough.

Cost-Benefit Analysis

Controversial though it is as a technique for normative analysis, my belief remains that cost benefit analysis is still the appropriate way of thinking about priorities in the area of pollution policy. Given that no society can afford zero risk options, we must weigh up the benefits of any control programme against the costs of implementing that programme. I accept that on what may be many occasions we shall find it difficult to measure the benefits in money units, which is what is required for cost-benefit studies. But I do not accept that as a reason for not trying to advance the technique as far as possible. Indeed, I would argue that the very process of using cost-benefit enables us to see the right context in which to make our decisions. Of course, decisions at the end of the day will be 'political', the result of many differing pressures within society, *ad hoc* events and so on. But that is no excuse for not doing what we can to inform those decisions and make them as efficient as we can.

Cost-Benefit in Air Pollution

I shall address my remarks here to the advances that have been made in assessing the benefits of air pollution control. I shall not consider the costs of controlling pollution, whilst being totally aware that even here we need refinement of our information, data and techniques.

My general theme is that we have made major advances in estimating the benefits of air pollution in the last decade. For more than two years now, I have been assisting OECD Environment Directorate in Paris with a comprehensive assessment of what we know about the benefits of pollution control and, obviously, air pollution is one large section of that work. It will appear in the near future under the title THE BENEFITS OF ENVIRONMENTAL POLICIES AS AVOIDED DAMAGE, a title that reflects the fact that environmental policy aims both to reduce existing damage and to avoid further damage as the sources of pollution in our economies grow. What have we found in these studies? I shall consider the main findings under the various types of damage that we believe air pollution is associated with.

(a) *Health*

This Congress has heard from epidemiological experts what the linkages between air pollution and human health are. Typically in epidemiology we seek to isolate the effects of air pollution on health by 'controlling' a group of persons exposed to levels of air pollution and tracing their medical histories through time. The population samples tend to be small. Yet economists have themselves undertaken a number of major studies which have come to be known as 'macro-epidemiology', a term indicating that their samples are usually very large and that they seek some general relationship between a given pollutant, or set of pollutants, and human health. Again, most of those studies concentrate on mortality because of the greater ease with which mortality statistics can be obtained. Unlike epidemiology in its more precise and narrower sense, there is no need in this procedure to assemble mortality statistics by 'cause of death'. The basic procedure is to take mortality as the independent variable and to express it as a function of as many 'suitable' variables as we can — age, socio-economic status, cigarette smoking, dietary factors, and so on. A multiple regression equation is then tested and, provided the normal statistical tests are met, the coefficient relating the pollution variable to mortality gives us the 'dose-response' relationship between pollution and the health effect. Similar approaches for morbidity have been fewer and the data problems are more complex. Nonetheless, the work of Lave and Seskin (1977), Crocker *et al.* (1979) and Chappie and Lave (1982) must be reckoned with. What is unsatisfactory here is that there have been few efforts to reconcile the 'micro' 'macro' epidemiological studies. But if we can take the economists' studies as providing broad indicators of dose-response effects, then we can follow Freeman (1979) in seeking some general 'elasticity' that expresses the percentage change in mortality and morbidity for a given percentage change in air pollution. If that elasticity is 'stable' in the sense that it holds for fairly large changes in pollution and across countries, then we obviously have a more valuable indicator for use in setting air quality standards.

The elasticities so obtained are open to dispute and the debate is fully rehearsed in the new OECD document THE BENEFITS OF ENVIRONMENTAL POLICIES AS AVOIDED DAMAGE. For our purposes the important outcome is that they would imply that reductions in particulate matter and sulphur oxides in the eight years from 1970 to 1978 could have conferred a benefit in 1978 of some \$20 to \$90 for each person in the USA (at that year's prices). To put it another way, the policies of the 1970 Clean Air Act and, to some extent, its Amendments in 1978 could have yielded some \$5-20 million of benefits in health terms alone in 1978. How far we

can say that a *further* improvement in air pollution on the same scale would achieve similar magnitudes of health benefits is, I suggest, far more questionable. For the basic problem is that the elasticity of response between health and pollution reduction is not constant as air quality improves, and indeed declines as we approach the kinds of levels found in some European countries. I think it is for this reason that a UK study of some sophistication (Chin *et al.*, 1981) found no relation between mortality and sulphur dioxide for the period 1969-73.

You will note that I have already expressed health improvement benefits in monetary terms. To do this I must be able to translate a lost life or a day's illness into money terms. Here again, while many find the procedures for doing this morally repugnant, it is essential to recall that no society behaves as if life itself is priceless. Were that so, our health services would receive all the money they needed and there would be no shortage of kidney dialysis machines and so on. The subject *is* unpleasant but, I suggest, unavoidable. The values I used when quoting that range of single year benefits for the USA ranged from about \$250,000 to \$1 million for each life lost and, indeed, the variation in the value used explains much of the variation in the results obtained. In turn, these values are not 'arbitrary' but are derived from the valuations that individuals in risky occupations appear to place on their lives by accepting compensation for more risky work. Nonetheless, there are countless problems and I do not wish to play them down. As a neglected example, let me simply observe that workers in risky occupations face much higher risks of death or injury than the risks we are talking about in air pollution contexts. They also, to a considerable extent, accept those risks *voluntarily* whereas few of us voluntarily expose ourselves to the risk of air pollution.

But if the magnitudes I have spoken of are correct, then, to quote one very recent study for the USA, "stringent abatement of sulphur oxides and particulates would produce social benefits (based on health effects alone) greatly exceeding social costs" (Chappie and Lave, 1982, p.371).

(b) *Exposed Surfaces*

If air pollution damages painted or metal surfaces it accelerates the rate at which those structures must be replaced. That is a cost to society and hence a damage that must be debited to air pollution. The same is true for everyday things such as fabrics. Extra washing means extra time and cost and these too are part of the social cost of air pollution. As with health, the dose-response relationship is disputed. Work in the USA, Norway and the

Netherlands has found positive associations and the cost of accelerated replacement has been estimated. In South Norway alone, for example, it is estimated that corrosion of painted steels and galvanised metals costs some \$14 million per year. Of some interest is the finding that for countries where the health benefits of further control are not readily demonstrable, reduced corrosion benefits could be significant. This suggests a cautious policy implication to the effect that air pollution control in *certain* countries may be justified more readily by reference to reduced materials damage than by reference to health benefits which, as we know, has been the traditional rationale for air pollution policy.

(c) *Crops and Forests*

Traditional studies have again used the dose-response relationship to suggest the kind of damage done to crops from air pollution. That this is not satisfactory has been amply demonstrated by researchers, notably in the study by Adams *et al.* (1979). They show that reduced yields due to air pollution may lead to different kinds of reactions by farmers, for example by increasing fertiliser application. Note too that if crops were badly affected by air pollution over wide areas, crop prices would be affected. Estimating the economic damage done thus becomes far more complex than was hitherto thought. Adams and his colleagues estimate, using a fairly sophisticated approach, that crop damage for four Californian regions totalled some \$44 million in 1976.

As to natural forests, we all know that the debate continues. Estimates of the money damage remain very uncertain and I have refrained from quoting any of them for this reason. But it is worth noting that if phenomena such as acid rain are implicated in forest damage, the economic evaluation procedure becomes peculiarly complicated. For forests serve not only a commercial function but also a recreational function and the function of providing habitat for wildlife. It seems worth remembering that while we do not trade some of these benefits in the market place, they are nonetheless real and must be entered into a cost-benefit study.

(d) *Aesthetics*

While the research in question is only a few years old, we already have an initial idea of the money benefits of improving visibility in areas of outstanding natural beauty. The techniques used here have traditionally been regarded as suspect — i.e. the use of questionnaires asking respondents how much they would be willing to pay to secure improvements in the quality of

the ambient environment. Photographs are shown to the individuals to illustrate the type of gains in question. Despite many problems, the results have been fairly impressive. Once again, they relate only to the USA, reflecting the strong research bias in the economics of air pollution and something which European countries need desperately to correct. The staggering result is that for one set of national parks in the USA — Grand Canyon, Mesa Verde and Zion — the value which people place on preserving those natural areas is some \$9.6 billion each year. (Schulze *et al.* 1981). If these figures are even remotely correct, we can see that the major justification for further air pollution control in countries like the USA will be in terms of aesthetic benefits. These are of course embraced in the concept of secondary standards there, but the result of interest is that the secondary benefits may greatly exceed the primary standards benefits. This is important because, as one would expect, the extra costs of reducing pollution even further rise, so that benefits would need to be substantial to justify further controls.

(e) *Ancient Monuments*

The damage being done to ancient monuments such as the Acropolis in Athens by air pollution is well known. Can economists say anything about the value of such historic treasures? One is tempted to say 'no' because such monuments are unique and once destroyed cannot be replaced. But whether the term 'priceless' can be used or not seems to me to be largely irrelevant. For I think we can 'invert' the process of valuation and ask ourselves what we have to do to prevent air pollution damage. Assuming we are not to coat the Acropolis in transparent plastic or continue to move parts of it for protection, that cost will be given by the cost of reducing pollution to levels which will not harm the monuments in question. Simple techniques exist for expressing such a cost in annual terms and we can then ask the question: 'Since it costs X million dollars to protect the Acropolis each year, do we value it at more than X million dollars a year?' If we do, we have an automatic economic rationale for outright protection through abatement schemes. If we find ourselves hesitant, we must then refer to the *other* benefits such protection would bring — e.g. the health and aesthetic benefits. Those, I suggest, may be directly quantifiable. If they come to Y million dollars, we can rephrase our question as: 'Do we value the Acropolis at more than X-Y million dollars a year?' In this way, as I mentioned at the outset, we have used the *framework* of cost benefit analysis to guide our thinking. I believe that is valuable in itself. And if anyone finds this all rather like an economist's fairy tale, let he or she ask why it is then that we have not *already* implemented a vast pollution control programme to protect such monuments. The issue of cost explains why not.

Conclusions

While I understand the suspicion with which many scientists regard economists, I am concerned to indicate that, outrageous and impossible as many of the economist's techniques may seem, they have a strong basis in terms of trying to rationalise, albeit in a limited fashion, the way in which we spend our money. I will be honest and say that my concern is that in years of recession we shall find the environment a 'dispensable' item. It is easy to relegate it to the bottom of our list of priorities. It is in this context that I suggest to you that cost-benefit has a role to play in demonstrating that, whatever the methodological and statistical and sometimes philosophical problems involved, there are still very substantial gains to be obtained from air pollution control. If anything, our programmes must be strengthened and not reduced or held stable. I do suggest, however, that we shall find the economic rationale for that control not so much in our traditional areas of concern such as health, but in the other benefits that air pollution control brings.

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VIth World Congress Proceedings

The Proceedings of the VIth World Congress on Air Quality (held 16-20 May, 1983, Paris, France) have been published as a set of six volumes, which contain nearly 300 papers, plus abstracts, and poster presentations. To order, contact: Peter Mitchell, IUAPPA, 136 North Street, Brighton. Price: £63 inclusive.

DIVISIONAL NEWS

NORTH WEST DIVISION

One Day Symposium on Asbestos

The North West Division organised a highly successful One Day Symposium on Asbestos at Warrington on 30 June, 1983. The meeting, attended by over 130 delegates, was designed to give a balanced update of current information on the environmental and safety aspects of asbestos.

The first speaker, Mr. R. Sykes, Senior Manager, Safety and Environmental Control, of TBA Industrial Products Ltd, discussed asbestos manufacture, the properties and uses of asbestos, and alternatives. Explaining the various types of asbestos and their sources, he indicated that UK usage was now less than half of the output of ten years previously. No crocidolite (blue) asbestos has been imported into the country since 1969, although it might still be present in older materials in place or in use. He outlined the uses and special properties of asbestos which make it difficult to find alternative materials for all applications. Some substitutes have been found, e.g. for building boards and similar applications, and research is progressing in other areas. Mr. Sykes also outlined the development of knowledge about asbestos-related diseases, describing the initial discovery of mesothelioma among workers in Blue mines in Cape Province, South Africa. Asbestos-related diseases are characterised by long latent periods, with a time scale from up to ten years for the development of symptoms of asbestosis, to up to 40 years for mesothelioma. It was therefore obvious that the discovery of such diseases today related to conditions in the past.

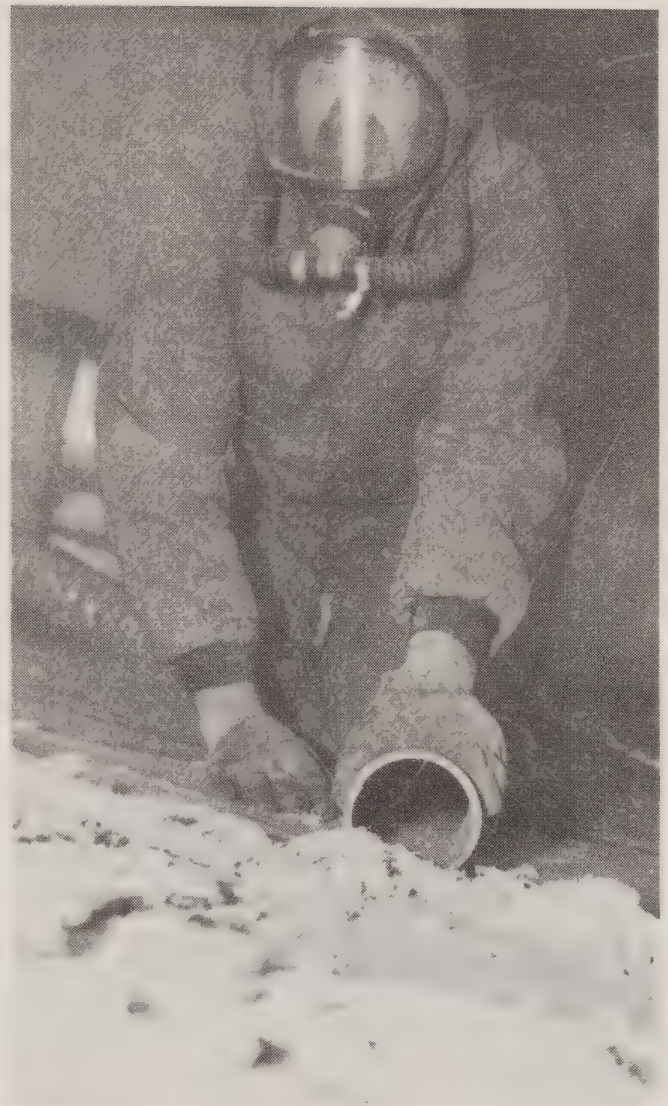
Speaking of monitoring and control, Mr. Sykes said that environmental levels are reported in both the working situation and in background urban atmospheres. Typically, atmospheric levels are about 100 thousandths of the occupational levels and are, in practice, very difficult to measure accurately.

The next speaker, Mr. R. Skeldon of the CEGB, gave the audience some guidelines and specific examples from his vast practical experience in the safe removal of asbestos materials in place, particularly in power stations. He outlined typical problems and illustrated the safety equipment used to protect workers, paying particular attention to the various face masks available and their suitability in different circumstances. Discussing the design and sealing of enclosures to contain the dust and slurries produced during removal, he also referred to the monitoring techniques necessary to ensure that measures were adequate, stressing the importance of close liaison between the sampling officer, supervisor, safety officer, contractor and the Health and Safety Executive. His experience proved that every job was different, necessitating a different approach. Best practicable means have to be devised to suit the situation and everyone involved has to be both flexible and extremely careful. Mr. Skeldon brought with him a microscope with slides of different fibres, from both inside and outside enclosures, for delegates to see during the interval.



Fully sheeted and sealed work area, prior to asbestos removal.

(Photos courtesy of Envirocor Ltd.)



High powered vacuum in action to remove scraped asbestos waste

Mr. S.N. Smith, of H.M. Factory Inspectorate, Health and Safety Executive, outlined the existing legal framework through which the Inspectorate works. The 1961 Factories Act and the Asbestos Regulations of 1969 apply in factory processes, including building and construction processes. Notification is mandatory if crocidolite is identified on any process or demolition job, following which best practicable means would be specified. Primary safeguards involve the provision of adequate mechanical exhaust ventilation, or, where this is impracticable, protective breathing apparatus. Areas have to be kept clean by dustless methods and any asbestos waste must be stored and despatched under controlled conditions in sealed containers. Young persons (under 18) are excluded from work with asbestos if protective equipment is required or while any cleaning process is taking place, unless by the vacuum method.

Discussing the use of the Health and Safety at Work Act, Mr. Smith said that it is a powerful general tool under which Codes of Practice of quasi-legal status can be drawn up. The 1981 Code of Practice, for example, should be followed in processes of stripping and demolition unless any other method proposed for use can be shown to be more effective. Best practicable means, as provided in Codes of Practice, can be updated to

provide stricter controls as new standards or methods become available. The Codes are supplemented by Guidance Notes which provide more detailed advice.



Bulk asbestos being scraped from ceiling prior to wire brushing, followed by 'Artex' coating.
(Photo courtesy of Envirocor Ltd.)

Answering questions on proposals for the licensing of demolition contractors, Mr. Smith agreed that there was a possible loophole, as the competence of contractors to operate was not a question to be taken into account at the time of the application, and that if and when such contractors were prosecuted for failure to meet adequate standards, there was no provision for specifying if and when they could conduct such operations in the future.

After an excellent lunch, Mr. P. Alcock, Assistant Principal Environmental Health Officer, City of Manchester, spoke about the local authority's role, and advice to the public. Mr. Alcock indicated the countless uses of asbestos products in public buildings

and in the home. He felt that public concern focussed increasingly on the potential dangers of asbestos in homes, rather than on industrial exposure. Surveys of asbestos dust in homes, conducted by the Asbestos Research Council, had shown levels of between 0.005 and 0.05 f/ml, but he pointed out that it is extremely difficult to judge domestic exposure; using TLVs is unrealistic, even when dividing by a factor of between 30 and 60. No safe level is known, particularly in relation to the longer exposure in the domestic environment. Because asbestos has been so widely used in the past, e.g. as backing for thermoplastic and vinyl floor tiles, and because the public is often ignorant of the presence of asbestos in such materials, they may be disposed of haphazardly.

He considered it essential to provide as much helpful advice as possible to the public, but acknowledged the difficulty of doing this when the circumstances of each individual case are unknown. He had several specific recommendations: first, that a central information point should be established so that advice is correct and consistent; second, that where removal of asbestos containing materials is necessary, specially trained teams should be used, with disposal carried out properly in special vehicles.

Environmental Health Officers have to be properly protected when investigating possible asbestos contamination. However, the appearance of an officer kitted out in respirator, overalls, gloves and overshoes can alarm householders, particularly if they have been told not to be unduly worried about the situation! The officer thus carries the double burden of working carefully and properly, and conducting good public relations at the same time. Mr. Alcock was concerned about the lack of guidance on public exposure to asbestos, and on necessary remedial measures. From his own experience, his advice was: to identify the material very carefully; if it proved to be asbestos, and in a damaged or friable state, it should be removed with all due caution. Where the asbestos material is undamaged and unlikely to be released, then it should be sealed, although again householders have to be persuaded that sealing is an effective measure.

The final talks were given by Mr. D. James and Mr. N. Harrison, Senior Managers of Waste Management Limited, who outlined procedures for safe disposal of asbestos waste. Their particular experience lay in controlled landfill, operated under the Control of Pollution Act 1974 (Special Wastes) Regulations 1980. Asbestos wastes amount to about 0.5% of the total tonnage of material currently disposed of by landfill methods. The regulations give very specific instructions as to safe methods of disposal (by burial under supervision on a licensed tip). Mr. James described the complicated notification procedure, whereby the contractors collect and deliver waste and ensure that the waste disposal authorities retain a clear record of all transactions, and of the final resting place of the waste. Even on licensed sites, constant supervision by managers and inspectors is essential to prevent any slackening of vigilance or complacency amongst those on site. Workers on site wear protective clothing when dealing with asbestos wastes, and each man has a yearly medical check-up, with an X-ray every other year. On a final, practical point, the disposal site manager is at the end of a very long chain in the process of dealing with asbestos waste, and unless the contents of bags of asbestos are clearly marked, his job can be very difficult!

In the discussion period that followed, points of concern that emerged from the floor were: the lack of an environmental control limit; the competence or otherwise of removal contractors, and the question of their licensing, and the need for stricter enforcement of existing legislation. It was generally agreed that EHOs could be helped in their work by the provision of more information by the Factory Inspectorate on local problems.

The North West Division Symposium made a valuable contribution to current knowledge on the subject. The programme was varied and comprehensive, and the speakers put their points across very clearly. The organisers deserve the warmest congratulations; particular thanks are due to Brian Douglas, Honorary Secretary, for his thoroughly effective organisation, and to Bill Snow, Chairman of the Division, who chaired the event.

NORTHERN DIVISION

The Annual General Meeting of the Northern Division was held on Friday, 10th June 1983, in the Council Chamber, Town Hall, Gateshead. The Mayor of Gateshead M.B.C., Councillor L. Carr, welcomed members of the Division and referred to smoke control progress in Gateshead and the lead monitoring surveys undertaken by his Council. Together with the achievements in noise reduction measures, the work showed that his Council has a real concern for the environment of the area, striving constantly to improve conditions for local residents. While such efforts might give the impression that Gateshead is a heavily polluted industrial area, the Mayor pointed out the other side of his Council's work, that of beautifying: Gateshead has been successful in winning the "Britain in Bloom" competition on more than one occasion.

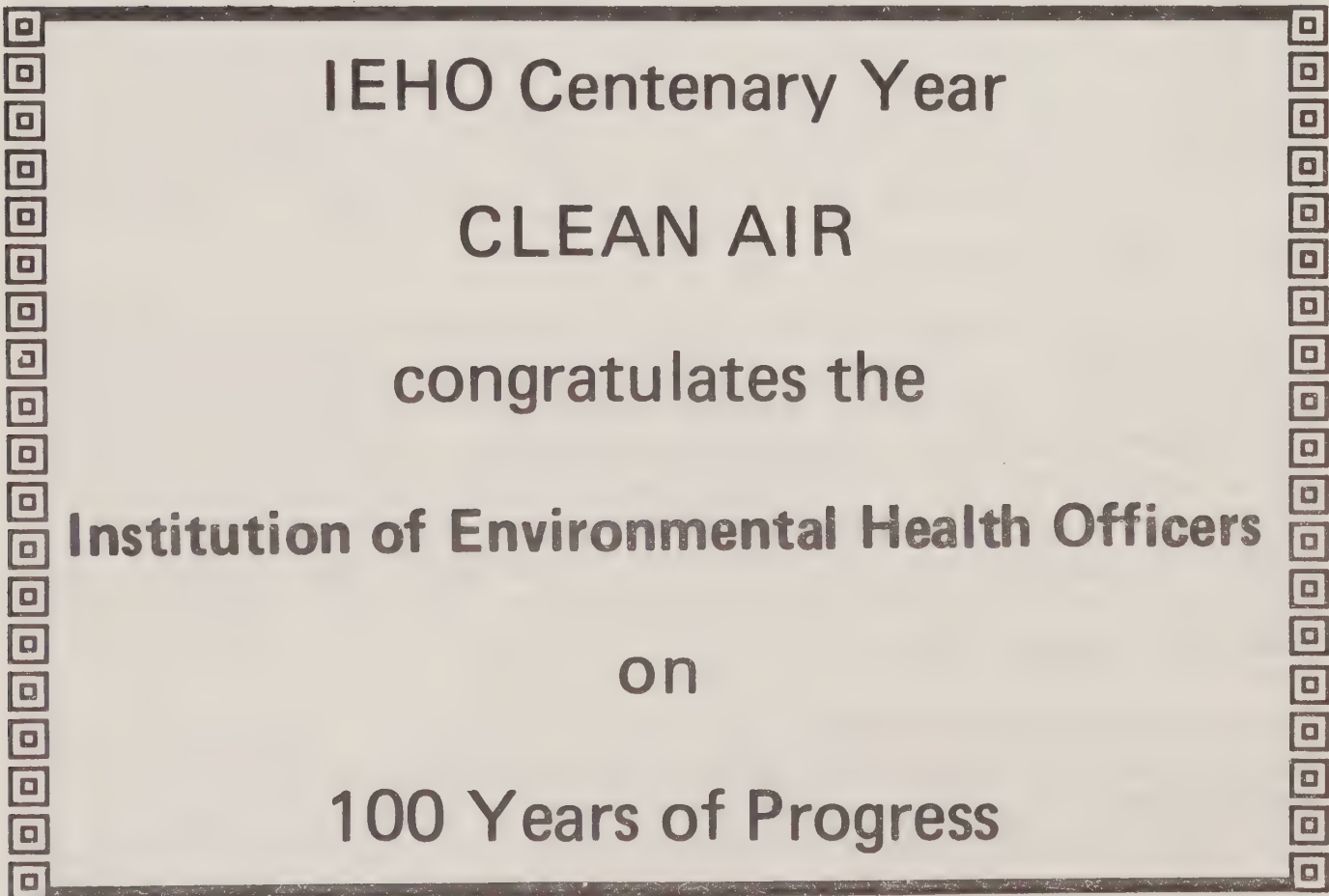
Councillor L. Poole, Chairman of the Division, responded by thanking the Mayor and his Council for allowing the Division the use of their delightful Town Hall and for their generous hospitality. At the formal business meeting which followed, Councillor Poole reported that the meetings held during the year had been well attended and he thanked all members of the Division for their support, and particularly the speakers who had willingly volunteered their services. He thanked the Secretaries for their efforts on behalf of the Division, and then drew members' attention to the 50th, 1983, Annual Conference of the Society. He said that Mr. Twyford, the Chairman of the Society's Council, hoped to attend the Division's next meeting.

The election of officers then took place, with the Chairman, Cllr. Poole, and the two Vice-Chairmen, Cllr. T.W. Yellowley, MBE and Mr. L. Mair, OBE being re-elected unopposed. Mr. W.C.B. Robson was re-elected unopposed as Honorary Secretary and Treasurer and Cllr. T.W. Yellowley was re-elected unopposed as the Division's representative on the Society's National Council.

After elections to the Divisional Council, the Chairman reported on meetings of the Council of the National Society for Clean Air and its Committees. The Secretary then drew members' attention to a letter received from the Secretary General regarding straw and stubble burning and the co-ordinated national monitoring programme. The Secretary then referred to the Society's response to the DoE Pollution Paper No. 18 ('Air Pollution Control': the Government's response to the 5th Report of the Royal Commission on Environmental Pollution). The only set of attributable comments received at Society headquarters were from Mr. Lander, Chief Environmental Health Officer of Middlesbrough Borough Council, who was invited to address the meeting on the subject, which he did with his usual eloquence.

Following the business meeting, Mr. F.G. McQueen, Principal EHO, South Tyneside Borough Council, gave an informative talk on "The Role of Local Authorities in Controlling Atmospheric Pollution". He referred to progress in implementing the recommendations of the Royal Commission's 5th Report, together with the changes that are resulting from the enactment of EEC legislation within the UK, including the introduction of the first mandatory air quality standards in the country. Having answered questions from the floor Mr. McQueen was thanked for his talk by Mr. N. Power, Deputy Chief Environmental Health Officer of Gateshead MBC.

W.C.B. Robson
Hon. Secretary



IEHO Centenary Year
CLEAN AIR
congratulates the
Institution of Environmental Health Officers
on
100 Years of Progress

LEAD IN THE ENVIRONMENT

Government measures announced in full

The Government's detailed response to the 9th Report of the Royal Commission on Environmental Pollution is published this month as Pollution Paper No. 19 (DOE, Central Directorate on Environmental Pollution, pub. HMSO). In his Foreword, Environment Secretary Patrick Jenkin calls the Commission's Lead report "a comprehensive overview" and "a sound and rational basis for decision making". The Government response covers action already in hand on many of the 29 recommendations made in the report, and a statement of intent on the others. Apart from the commitment to lead-free petrol (the Government will work to the Royal Commission's target date of 1990 and attempt to improve upon it if possible), target dates are set for the completion of surveys of water zones, and for the main programme of remedial water treatment measures. Further publicity will be given to the hazards of old leaded paint and research will be continued into sources of lead in the environment (such as alcoholic drink and dust) whose significance is not fully understood.

To help local authorities with their major role in dealing with local sources of lead, a new Steering Committee on Environmental Lead Monitoring, chaired by DOE, will be set up. This will bring together all the various bodies with an interest in lead pollution, work closely with local authorities to provide advice and guidance wherever necessary, and assess the efficacy of central and local measures to reduce exposure to lead.

Lead in Water

Although surveys of lead levels in drinking water are complete in over 1,100 water supply zones in England and Wales, surveys in a further 500 zones, serving 12 million people, have yet to be completed. 50 of those zones will be surveyed after changes already in hand to improve the quality of water supply have been made. A target date of June 1984 has been set for the completion of surveys in the remaining 450 zones, and June 1985 for the other 50. From results so far, it appears that water in some 10% of zones will require remedial treatment to reduce its plumbosolvency. A target date of 1989 for the completion of the main programme of remedial measures has been set. Treatment schemes have already been introduced for some areas particularly at risk in Scotland, and further surveys of lead in water are being carried out by more Scottish Water authorities. The timetable for further remedial work there has yet to be discussed. Where plumbing needs replacement, extended home improvement grants are already available in some circumstances, and arrangements for grant aiding in England and Wales are to be reviewed. In Scotland, grants are already available to both tenants and owners of property.

The Government say there has been low take-up so far of grants for plumbing replacement indicating that this shows the need for provision of further education and publicity on the matter. Government are looking to local initiatives to cover most of

the need but the Health Education Council has also undertaken to review ways of informing those most at risk from lead in water of the steps that can be taken. In Scotland, every household has already received a leaflet on the hazards of lead in water and the availability of grant. In the public sector, it is left to local authorities or other bodies to determine the priority to be given to remedial work in public buildings.

The Water Research Centre is to publish the results of their investigations into the possible effects of lead soldered copper pipes on water quality. The work suggests that although contamination from well-made joints is negligible, problems can occur when joints are badly made and where water remains undisturbed in pipes for long periods. Further studies are to be commissioned to examine typical institutional buildings and private dwellings. Meanwhile, discussions are taking place with plumbing fitting manufacturers to determine whether the use of lead based solders could be phased out.

Lead in Food

Apart from further work to study the total dietary intake of lead and the research into the lead content of alcoholic drinks, the Government welcomed the decision of UK food can manufacturers to phase out the use of lead solder by 1985. Lead soldered cans will be replaced with two-piece and welded cans.

Lead in Paint

The Government have already produced an information note explaining the hazards of lead in paint. Although over 100,000 copies have been distributed to local authorities and other organisations, more is needed in the way of publicity. A major campaign, involving the media, manufacturers and retailers is planned for the autumn.

The Laboratory of the Government Chemist is evaluating methods for the detection of lead in painted surfaces. Its findings will be made known as soon as possible. Government are also examining the scope for reducing the lead content of paint and holding discussions with the Paint Makers' Association about the practical and commercial implications. Local authorities are invited to adopt a low lead specification for paint used in schools, houses and for metalwork in parks and recreational grounds. The lead content of yellow road paint is also being reviewed.

Regulations to implement the EC Directive on precautionary labelling of all paint containing more than 0.5% lead are to be made later this year, with appropriate publicity.

Industrial Emissions

HMIAPL are to review emissions of lead from scheduled processes during 1983/84 and explore the scope for revising current BPM requirements. Research will be continued into the ways in which lead emissions from different industrial sources contribute to surrounding concentrations of lead in air and dust.

Angling and Shooting

Because of the widespread lead poisoning of swans from anglers' lead weights, efforts are to be directed towards phasing out lead in angling by 1986. No such steps are to be taken to control dispersal of lead shot although Government intend to review the environmental significance of lead shot and possible alternatives further.

Research and Monitoring

Some further research into health effects of lead is underway, sponsored by the MRC and DOE. The Government response casts doubt on the relevance of animal studies, and the future of such work will be discussed later this year. On the question of the much-needed guidance on methods of sampling and measuring lead in dust, and effective remedial action, nothing positive emerges from this document. However, the results of a two-part research project already underway into the relative contributions of different sources and pathways to lead in dust will be reported to the Steering Committee on Environmental Lead Monitoring, which will consider the possibility for guidelines.

70 local authorities have reported to DOE details of general environmental lead monitoring projects in their areas. The Government response points out that while monitoring is certainly valuable it should not necessarily be a priority in every case and every local authority. "The Government firmly believe that local action should be on a scale appropriate to local needs and circumstances. But local authorities will no doubt note the Royal Commission's view that local environmental lead monitoring has an important part to play in the promotion of environmental and public health." The Government appear to be acknowledging the fact that local concern is bound to put pressure on authorities to carry out surveys, but unwilling to supply any money specifically for this purpose. On the co-ordination of data, the Government have already held discussions with local authority associations in order to evolve an approach which will make more effective use of existing programmes "without placing unnecessary additional burdens upon the local authority resources". The agreed programme will include: a new series of annual blood lead surveys of adults and children (similar to the EEC blood lead surveys); co-ordination of information on air lead monitoring schemes; some additional air lead monitoring (linked, as far as possible, with the blood lead surveys); continued monitoring of dietary lead intakes and deposition of airborne lead on food crops; further work on the importance of dust as a pathway of lead; and co-ordination of information from lead in water surveys. The Steering Committee will co-ordinate and evaluate the various exercises and propose areas where further work is needed.

Lead in Petrol

The Government response was published too soon to take account of the recent West German declaration on lead-free petrol. However, the UK initiative within the EEC already has the strong support of the Federal Republic of Germany, the Netherlands and

Denmark, and the Commission has been requested by the Council of EC Environment Ministers to examine ways of reducing lead in petrol, including eliminating it altogether. The precise route and transitional arrangements have yet to be discussed with European motor and oil industries. As to price or fiscal incentives to encourage the use of lead-free petrol once it is available, the present Government feel that any decisions on such measures should be left to the Government of the day.

The Government's response shows that the Royal Commission's report has been carefully considered. However, there is a note of caution throughout: an unwillingness to spend central government funds too freely, emphasis on the need to evaluate the efficacy of control measures — generally, a determination to leave expensive remedial work firmly in other hands wherever possible. Central government will play a co-ordinating, supervisory or educational role as appropriate, but there is obvious reluctance to introduce legislative measures, e.g. to control and further reduce the lead content of paint. Efforts will be concentrated on lead in petrol in the European arena, and on negotiations with a wide range of interested parties on other aspects. The emphasis in some areas appears distorted — why not ban lead shot, as the Royal Commission recommended, when anglers are to be controlled? Lead shot is surely widely dispersed, and potentially available to be taken up by many different forms of wildlife.

Apart from lead in petrol, there are two main areas that should be followed up vigorously. Householders *must* be encouraged to take up whatever grant is available for remedial plumbing work, and, where old lead paint is a hazard, parents *must* be made aware of the problem. The existing Government Information Note is woefully inadequate — couched in terms comprehensible to the monied middle-class, but not designed for the poorer inner-city dweller — and in the wrong language for many who might need it. Government are right to identify the need for more publicity, but it should be accurate and free of both jargon and the somewhat stilted bureaucratic approach. It must strike home in cultural, as well as linguistic terms. Finally, the Steering Committee on Environmental Lead Monitoring will have an important job to do. It is to be hoped that its work can proceed swiftly, with full support from all sides; guidelines are needed sooner rather than later.

CLEAR Critical of Lead in Paint Policy

A CLEAR survey revealed that some new cans of paint labelled 'lead-free' contain significant quantities of lead. They have called for a statutory ban on lead in domestic paint within three years, and criticised Government policy on lead in paint as "unbelievably weak". CLEAR are also critical of advice, in a Government information note, that old leaded paint can be safely removed by hot air tools at a temperature below 500°C. Their tests have shown a considerable risk of dispersal of paint dust and paint chunks with this method.

LETTER TO THE EDITOR

From G.S. Parkinson, Woking, Surrey

The Case of Lead

Professor Rutter has done the cause of rational debate good service. For too long lead has been a subject overladen with hyperbole and fanciful speculation, which chimera he has now rightly dismissed to allow the issues to be explored analytically once more.

In his masterly analysis ('Clean Air' 1983, 13, (1), 17) of the psychometric studies of low lead level exposure he is at pains to point out that the "lead attributable" variance in the cognitive factors was very small compared to genetic and environmental influences. Lead, he thought, accounted for not more than 2 to 3 per cent of the total variance in IQ found between the groups tested.

It is a significant pointer to the emotion lead has aroused that it should be considered necessary to devote much painstaking intellectual effort to dissecting out what is, after all, a very small component. It is hard to think of any similar situation where the argument is concerned with the interpretation of results which fall in the realm normally assigned to chance.

To make this point is not to imply that the analysis was inappropriate; rather that it was made appropriate by the circumstances. What I should like to argue is that one can proceed further with the analysis of the scientific issues, before passing on to the policy implications.

I shall turn first to the question of how much lead in the body may be derived from petrol by ingestion and inhalation. As the Royal Commission observe this must vary with individuals and one can only make estimates given various assumptions. I do think, however, Professor Rutter, when he made his estimates, ought to have pointed out some of the flaws and inconsistencies in the Turin study and in the American blood lead data when he quotes them as evidence. Mean blood lead levels have declined in this country too, over the last decade, and there has been no reduction at all in the amount of lead used in petrol.

It is not my intention to argue this subject further, other than to say that the relevant issues were fully discussed at a recent MRC symposium at Cardiff* which took an agnostic view on the lead in petrol contribution. For the sake of this argument let us assume that on average 30 per cent of the body lead in children comes from petrol. This must mean that the variance of 2 to 3 per cent of total lead is now reduced to about 1 per cent, attributable to lead in petrol. But this figure is a mean as Professor Rutter points out and will be made up of individuals with higher and lower proportions. Let us now make the assumption that half of the children in the test group have no petrol lead related effect at all. The mean for the other half will still only be about 2 IQ units. In fact no matter how we vary both sides of the equation the "more than average" deficit will still be small, both

in IQ number deficits and actual numbers of individuals having higher IQ deficits, because the overall average is small.

We can safely ignore those children where the attributable IQ deficit due to petrol lead is below 1 number. Let us now look at the others.

Professor Rutter cites three classes of children who could fall into this category; the malnourished, the socially deprived and the very young. What I fail to understand is how the removal of lead from petrol can, in any significant way, ameliorate the condition of anyone in either of the first two groups. Social deprivation has roots which go deeper than those affected by lead; as Professor Rutter himself stresses, the multifarious passions and crimes of our civilisation are not so easily explained away. Malnutrition may spring from poverty, from psychological disorder, or from social customs; it does not come from petrol.

There remains the category of the very young, who may ingest lead by sucking their fingers. This is always a potential source and it will never be possible to prove or disprove the hypothesis. Recent studies utilising hand 'wipes' provided by mothers and children discussed at the MRC conference did not seem to provide much evidence of the practice, at least in the groups studied. But, as the overall lead effect found is small, so the number of children who ingest any measurable amount of lead by this method must also be small.

The other significant point from Cardiff was summed up by one speaker as 'cleanliness is next to leadlessness'. Once again, we come back to personal hygiene and social habits and whether lead removal could make any difference to the potential for disease they bring, if unsatisfactory. I imagine there are many more animate and inanimate species, some very virulent, waiting for entry to the body from unclean surroundings by the sucking finger route. These can also include lead from old paint, a known cause of lead poisoning in children, to which Professor Rutter ascribes a much lower priority for action.

Surely, if 98 to 99 per cent of the IQ variance is not petrol lead related it is more logical to see if anything can be done to improve things in this area at the same or less cost than removal of lead in petrol. Some of the difference is genetically determined and cannot be changed, some is environmental and might be reduced. I do not wish to enter the controversy as to the relative proportions arising from nature and nurture, other than to note that some of those who have been most vociferous in the lead debate would, in other contexts, have totally rejected IQ as a yardstick of innate intelligence.

In his summary of the CLEAR Conference, Professor Rutter warned that the removal of lead from petrol would not bring about a major improvement in public health and that to claim this was to risk a real danger of a backlash when the hopes were unfulfilled. I am sorry he did not repeat this in his present article. It is possible, however, that quantifiable improvements in public health could be made by selective intervention to improve social deprivation, malnourishment and unsatisfactory living conditions, which

Professor Rutter cites as three main reasons for excessive lead ingestion.

As a bonus, lead ingestion would be reduced; whereas removing lead from petrol will do none of those things and will be an indirect and ineffective method of reducing lead input to the body.

It is inevitable that one's mode of thinking is conditioned by one's working environment, and mine has always been in Industry, latterly the oil industry, although in putting forward these views I speak for no one but myself.

**Lead in Wales: MRC Epidemiology Unit, Cardiff, April 27th 1983.*

AMENDMENTS TO THE LIST OF SCHEDULED WORKS

In August 1983, the control of air pollution from some 300 factories passed from local authority to Industrial Air Pollution Inspectorate control, as a result of long-delayed regulations made under the Health and Safety at Work Act.* The Regulations deschedule a number of processes no longer used in the UK, and hand over to the Inspectorate the control of asbestos works, to include the stripping of crocidolite from railway vehicles, and the destruction by burning of such vehicles containing crocidolite at special installations. Other major additions are several types of lead and di-isocyanates works. Concurrently, the list of materials scheduled as "noxious or offensive substances" has been expanded to include asbestos, metal carbonyls, vinyl chloride, ethylene and the higher olefins.

As a result of the repeal of Section 78 (3) of the Control of Pollution Act, 1974, the Inspectorate will no longer have to undertake time-consuming prosecutions for offences involving cable burning. It is expected that the responsibility will pass to local authorities. Following the descheduling of certain works, local authorities will in the future have control of most ceramic works (excepting the Fletton Brick industry and the one remaining salt glazing works) and works where cement is bagged.

** Health and Safety (Emissions into the Atmosphere) Regulations 1983 SI No. 943 1983, pub. HMSO £2.70 net.*

RUBBISH BURNING JUDGED A "PROCESS"

Sheffield City Council versus A.D.H. Demolition Limited

A principle well understood by Environmental Health Officers has been upheld on appeal in an important ruling. In a judgement delivered on June 9th, Lord Justice Griffiths and Mr. Justice Taylor held that a vacant demolition site where the burning of rubbish was carried out was capable of being "premises ... on which matter is burnt in connection with an industrial or trade process", within Section 1(5) of the 1968 Clean Air

Act. Furthermore, the burning of rubbish was held to be a "process" within the meaning of the Act.

The appeal overturns an earlier decision in a Magistrates' Court that the word "premises" only covered actual buildings. Lord Justice Griffiths said that Section 1 of the 1968 Clean Air Act referred to chimneys of any buildings, and it was clear that the purpose of the 1968 Act was to considerably extend that provision. There was ample authority to support the view that the word "premises" covered more than the building standing on a particular piece of ground.

The original case before the Magistrates was made against demolition contractors, in that they were occupiers of premises at 166-174 Manvers Road, Sheffield, from which dark smoke was emitted contrary to Section 1 of the 1968 Clean Air Act. The five houses originally on the site had been demolished and a bonfire lit to burn rubbish which covered the space of three of those houses. Lord Justice Griffiths upheld the Magistrates' conclusion that the judgement of a qualified Environmental Health Officer as to the shade of smoke was admissible evidence. The company's submission that there was insufficient continuity of activity in the burning of rubbish by means of a bonfire on site to constitute a "process" within the meaning of the Act was not upheld. Lord Justice Griffiths ruled that the word should be given its ordinary meaning and that it was a natural usage of the word to refer to the "demolition process". The Magistrates, he said, had erred in connecting the word with manufacturing or other industry of a kind usually associated with factories or workshops.

The Divisional Court has thus, apparently for the first time in a reported case, established that an open demolition site can be described as "premises", and secondly that the burning of rubbish constitutes a process under Section 1(5) of the Act. Anyone wishing to discuss the case and the appeal in detail should contact David Bird, Principal EHO, Sheffield City Council on Sheffield 734653.

Advertising Standards Authority upholds objection to "Smokeless" description of Paper Briquetted Fuel

The Environmental Health Department, Stoke-on Trent City Council, lodged a complaint with the Advertising Standards Authority in 1982 about two advertisers who had used the expression "smokefree" or "smokeless" to describe the paper fuel produced by briquetting devices. The Director for Environmental Services was concerned that the fuel produced might not be smokefree, since paper is not an authorised fuel under the terms of the 1956 Clean Air Act. He therefore questioned the validity of the claim. The Advertising Standards Authority concluded that the complaint was justified, noting that under the Act, authorisation for fuels produced by the "logmaker" would be unlikely since manufacture could not be controlled to a sufficient degree to ensure uniform quality of any fuel produced. The advertisers, Burlington House Marketing Limited of Middleton, Manchester, agreed to delete references to "smokefree" or "smokeless" in future advertisements.

SOCIETY NEWS

NSCA Speaks out on Acid Rain

The Society's Technical Committee has established a Working Party on Acid Rain, but in view of the increasing amount of public and political discussion of the subject, the Society decided to issue, in July 1983, an interim statement of its conclusions and recommendations, as follows:

"The National Society for Clean Air, the leading UK voluntary body working for air pollution control, has given long and detailed consideration to the science and politics of acid rain. International aspects of the problem have been widely debated at NSCA Conferences and technical meetings. Recently, the possibility of national problems has emerged; there are fears that acid deposition may be affecting parts of the UK, notably Scotland, NW England and Wales.

The following statement sets out the NSCA's conclusions on the effects of acid rain, outlines current control initiatives, and summarises the NSCA's position on necessary action.

THE NSCA RECOMMENDS:

- that the downward trend in UK emissions should be pursued as a positive policy;
- that the UK and other signatories to the UN ECE Convention should agree to meet a target percentage reduction in emissions by a specified date, the strategy for achieving this to be the responsibility of individual countries.

EFFECTS OF ACID RAIN

The combustion of fossil fuels produces millions of tonnes of sulphur dioxide and nitrogen oxides every year. Transboundary air pollution as a result of these emissions has caused international concern because of its contribution to acid rain. The mechanism and the effect of wet and dry acidic depositions have been studied extensively, although many important aspects are as yet imperfectly understood. On the basis of material published to date, the NSCA concludes that:

1. A proportion of pollutants can and do travel 1,000 km or more from their point of emission. Certain weather conditions favour the long range transport of air pollution.
2. Both sulphur and nitrogen oxides contribute to the acidity of rain, and other pollutants may be involved. Acid deposition at remote receptors is related to sulphur and nitrogen compounds (mostly sulphates and nitrates) roughly in the ratio of 2:1.
3. The significance of the relationship between past emission trends for SO_x and NO_x and the acidity of precipitation is still not clear. Whilst emission rates have varied

with time, there have been no substantial changes in the average measured acidity or sulphate content of rainfall in Europe at least since 1965, although there are local variations. In Scandinavia, measured nitrate and sulphate concentrations in rainfall have shown on average a significant increase in the 20 year period to 1975. No station showed a decrease in nitrate concentration.

4. The long range transport of sulphate aerosols can reduce visibility over wide areas. The same may be said of photochemical haze produced in sunshine from a combination of NO_x and hydrocarbons.
5. There is strong evidence associating declining fisheries in Scandinavia with acid deposition. But there is not as yet an adequate scientific basis for assessing whether the problem is growing or for predicting what improvement could be expected from a given reduction in emissions.
6. Direct damage to forestry from acid rain or from soil damage resulting from acid depositions is uncertain.
7. Land use practices, farming methods and forestry can contribute to changes in the acidity of groundwater.
8. Compounds of sulphur and nitrogen may have adverse effects on health and crops, although any effects of acid rain itself remain to be established.
9. Material damage by wet and dry deposition of sulphur and nitrogen compounds is well known in urban and industrial areas. In most cases, the cause will be local rather than distant emissions. This is particularly true of damage to architectural stonework.
10. Other effects of acid depositions are of concern in particular areas of Europe, notably those which possess soils of poor buffering capacity. Elsewhere, acid deposition is of minor consequence because of the neutralising capacity available.
11. Research into the problems and the means of overcoming them should be progressed as a matter of urgency and co-ordinated centrally.

CURRENT CONTROL INITIATIVES

Acid rain has become the focus of political concern. In 1982 the Ministerial Conference in Stockholm concluded that: "The acidification problem is serious and even if deposition remains stable, deterioration of soil and water will continue and may increase."

In March 1983, the Prime Minister, as a member of the Council of Ministers of the European Communities, signed a statement that "the damage done to the forestry environment by acid rain makes effective joint action urgently necessary." The statement then goes on to invite the Council to give rapid and positive attention to the proposals

announced by the Commission of the European Communities, both for action in the Community and in the context of the UN ECE Convention on Long Range Transboundary Air Pollution. The need for Community action was reinforced at the subsequent summit meeting in Stuttgart.

The proposed action takes the form of a draft "framework" Directive empowering Council to set emission limits on a number of pollutants from a wide range of industrial processes. This would reduce local pollution concentrations, although overall it would only affect 25% of emissions in Europe (including USSR), which currently total about 60 million tonnes of SO₂ per annum, of which 4.25 m.t. are produced within the UK. The costs of control are hard to define, being dependent on the control systems adopted and on the combination of technologies used. For example, SO₂ emissions could be controlled by desulphurisation. The OECD put the cost of removal at about £250 per tonne SO₂, which appears realistic for large power stations although other studies looking at a range of industries have put the costs higher. On the OECD basis, the eventual cost of a 50% reduction throughout Europe would be in the region of £8000 million per annum, of which the UK share would be approximately £500 million per annum. The extra energy consumed in the desulphurisation process may add about 5% to the fuel requirement for the production of electricity, which would then impose corresponding price increases on other industries. In the UK average electricity prices would have to rise by about 5p in the £ (assuming no technological advances take place to offset this penalty).

NSCA RECOMMENDATIONS

The balance of costs against benefits of controls is inevitably weighted by the body of scientific evidence, public opinion, as well as commercial and national interests. The NSCA exists to further the cause of clean air and to urge responsible action by Government on behalf of the environment. The impact of our emissions on other countries must not be neglected. The downward trend in UK emissions must be pursued as a positive policy. However, such action will achieve little in isolation. The problem of acid rain is a function of many emissions from many sources in many countries, and the solution must be found in the same broad context. We see this as achievable under the terms of the UN ECE Convention, which requires countries to limit and so far as possible gradually reduce and prevent air pollution, including long range transboundary air pollution. The NSCA recommends that the UK and other signatories should agree to meet a target percentage reduction in national emissions by a specified date — the strategy for achieving this to be the responsibility of each individual country."

As this statement indicates, the Commission of the European Communities has taken a lead on action under the Convention. Major damage discovered in forests along the Eastern border of the Federal Republic of Germany, together with pressures for the "greening" of West German politics, led to acid rain being put firmly on the EEC agenda during the FRG Presidency. On July 1 1983, a new West German measure to reduce SO₂ emissions from major combustion installations came into force, and on July 20th, the FRG Cabinet decided to introduce legislation for stricter controls on emissions from

mobile sources. In a move quite outside the normal EEC negotiations and procedures, the West German Government plans to introduce lead-free petrol and catalytic controls on motor vehicles in 1986. While the FRG would prefer to work in harmony with other Common Market partners, they are prepared to go ahead unilaterally with these measures if the EEC cannot move swiftly to meet the 1986 deadline. The principle aim seems to be the control of NO_x and hydrocarbons emissions, which in reaction with sunlight can produce the raised ozone levels thought to be partly responsible for the forestry damage. It is unlikely that Germany's decision to tighten up controls can be ignored by other members of the EEC. The West German motor manufacturing industry is strongly competitive in the European market, and this is bound to put pressure on the industry in other countries to follow suit. In a further development, Austria announced in August that it would be taking the same measures as West Germany, and for the same reasons.

Monitoring Emissions from Straw and Stubble Burning

Air pollution arising from straw and stubble burning has been a recurring theme at Conferences and meetings of the Society. The Council of the National Society for Clean Air has resolved to secure more effective control of smoke and smut emissions; among proposals put forward are extension of local authority powers to include prior approval of burns in their area, and a more stringent supervisory role. In the meantime, up and down the country farmers continue to burn off stubbles and surplus straw, creating pollution on a scale which would ensure rigorous prosecution were the perpetrator an industrialist. For the farmer, burning is a quick and inexpensive way of clearing the ground and dealing with surplus straw. For the public it is an unmitigated nuisance, creating smuts and excessive smoke, hazards to road traffic and causing damage to wildlife and hedgerows.

The National Farmers' Union, which is concerned that the farming industry should not fall into disrepute because of the practice, revised the Straw and Stubble Burning Code in 1982 and 1983. This now advises farmers to take wind direction into account in order to avoid smoke and smuts going towards roads and buildings. The NFU also pressed for and secured an increased maximum fine for breaches of local byelaws which incorporate the main provisions of the Code. The NSCA welcomed the amendments to the Code, but feels that even with fairly general adherence to its provisions, the scale of the harvest burn means that problems are inevitable.

The quantity of straw burnt after the cereal harvest has increased in recent years as grain production has risen and demand for straw in the main cereal-growing areas has fallen. It is estimated that of the 13.5 million tonnes of straw produced, 6.5 million tonnes surplus to requirements are burnt. In high density cereal-growing areas, as much as 44% of the total land area may be burnt during the harvest season, and as the area under cereal production increases so will the amount of land burnt each year.

Despite some very useful investigations into the control of air pollution from straw and stubble burning conducted by Warren Spring Laboratory, little work has been done

so far to establish just what effect straw and stubble burning has on air quality. It is not yet known whether the emissions can amount to a health hazard, or how far they can spread. The National Society for Clean Air therefore decided to co-ordinate a programme of monitoring, beginning in the 1983 harvest season, to try and establish the nature and extent of the problem, and provide the necessary evidence for future action. Starting on a small scale, the Society hopes to extend the work in future years. The three-pronged exercise carried out by local authorities involved in the programmes covers:

1. Analysis of historical data on smoke and SO₂ emissions to show the impact of straw and stubble burning over the years.
2. Studies of visibility reduction during the harvest season.
3. Measurements of smoke and smut deposition in selected areas during the harvest season.

The local authorities taking part in the 1983 programme collected the following information:

1. Date, time and duration of "burns".
2. Location (with Ordnance Survey grid reference where possible).
3. Meteorological conditions.
4. Details such as dimensions of field, type of area, type of crop, method of burning.

Members of the public were also asked to help by logging details of smoke emissions and effects and reporting problems caused by smoke and deposition of char and smuts to local environmental health departments. Publicity given to the Society's initiative in the local and national press also stimulated many individuals to write to us with vivid descriptions of the problems they have had, particularly with smuts fall-out, this year. Letters have also come from doctors, industry and local authorities.

Warren Spring Laboratory have played a crucial part in the success of the operation, holding an important briefing at the Laboratory for all local authorities involved, and taking on the responsibility for correlating data. Results will be announced as soon as possible.

Future Coal Use and the Adequacy of Existing Legislation

A meeting was held in March this year between representatives of the Air/Noise Division of the Department of the Environment, Warren Spring Laboratory and the Society, to discuss the adequacy of existing legislation and procedures to meet projected increases in industrial and commercial/public sector coal burn.

DOE representatives were Mr. L. Rutterford, who chaired the meeting, and Mr. P. Burgess. Dr. A.W.C. Keddie represented Warren Spring Laboratory and the Society was represented by Mr. D. Clark of Middlesbrough B.C., Dr. M.J.R. Schwar and Dr. D. Ball of the Greater London Council, and Air Commodore John Langston.

Opening the meeting, Mr. Rutterford said that DOE welcomed the discussion which had been proposed by the National Society. In its response to the 5th Report of the Royal Commission on Environmental Pollution the Government had tasked his Division with the review of all clean air legislation. Important aspects would be the powers available to local authorities in dealing with air pollution and the adequacy of control powers generally in relation to the requirements set by air quality standards. The review would be comprehensive and for obvious reasons could not be rushed; however, he hoped that it would result in the publication of a Consultation Document towards the latter part of the year.

The meeting then went on to discuss the first question put by the Society, concerning the effectiveness of using the Chimney Height Memorandum to ensure that local air quality would meet the limits/guide values specified in the EC Directive, and the means of overcoming any deficiencies. Dr. Keddie agreed that the application of the Memorandum could not alone ensure that pollution levels would meet the air quality limits specified in the Directive. In the event of a sufficient transition from gas and low sulphur oils to coal, it was unlikely that increasing the height of a chimney to compensate for the increase in sulphur content of the fuel used would be sufficient to prevent some deterioration in air quality.

Mr. Burgess said that in general the intention of the current approach was to extend smoke control across the remaining areas of the country, where necessary. In this respect more powers might be needed, more particularly to cater for SO₂ from low level sources. Sulphur from domestic sources might pose particular problems, and it was not inconceivable that some form of "sulphur control area" might have to be introduced. On the other hand, he felt that there was less uncertainty over measures required to deal with the industrial side, as effective control should be possible through use of existing powers. Nevertheless, consideration was being given to providing local authorities with powers similar to those of the IAPI (subject to appropriate reservations) including those permitting "BPM" coupled with prior approval. The Consultation Paper would develop such issues. Mr. Rutterford said that he did not regard these matters as being of great urgency as there appeared to be no reason to foresee a rapid change away from the use of convenience fuels in the domestic/small commercial areas.

Summing up this phase of the discussion, Mr. Burgess said that for the immediate future the existing regulations were adequate although international pressure on the question of the Long Range Transport of Air Pollution might have to be taken into account sooner rather than later. The immediate problem was therefore to establish the timescale and the magnitude of the change-over to coal. This was a major conundrum since current fuel use patterns were not indicative. Dr. Schwar agreed, adding that it was essential to think about the issues now since the legislative process was inevitably slow and there could be no room for complacency.

With regard to the Society's second question, there had unfortunately been insufficient time to provide an answer as to what magnitude of change in coal burn in a given area was likely to be significant in terms of subsequent changes in air quality. However,

Dr. Keddie made the general point that more attention should be paid to fuel use inventories. Dr. Schwar thought it essential for fuel use inventories to be undertaken at regular intervals at a local/regional level, which could most effectively be done with the clear support of central government. This information could be used in conjunction with computer modelling to estimate with sufficient accuracy how changes in fuel use would affect local or regional air quality. It would be important to obtain the full co-operation of the fuel supply industries so that when data was requested or provided, this could be done on a consistent basis across the country. Air Cdre Langston asked whether the current thinking was therefore towards air quality management and away from the current reactive approach. Mr. Rutterford said that, for the purposes of the legislative review, the Department was considering how an appropriate degree of air quality management could be accomplished to enable the UK to continue to meet the requirements of the Directive. This involved consideration of the relationship between air pollution and planning legislation, and powers to control fuel use. The whole issue was one of some complexity and if care was not taken, substantial extra burdens could be placed on local authorities. It was possible that it would have to be tackled largely by non-statutory guidance.

The meeting then went on to consider aspects of the EC Directive on smoke and SO₂ in relation to the stated requirement that air quality standards should not be permitted to deteriorate to any significant extent. Dr. Keddie said that he thought local authorities must be left to set their own standards providing they did not allow concentrations to exceed the limit values. Acknowledging this, Mr. Clark said that the local authorities would, however, require additional guidance on the factors to be taken into account in granting permission to change over to coal. Mr. Rutterford noted that there were technical problems as to the guidance it was possible to give on selective permission to increase coal burn. Dr. Keddie noted that regulating fuel use might also produce trading problems affecting all aspects of a company's operations. Mr. Clark said that all such decisions, and the regulations underlying them, would have to be properly balanced; in his opinion, local authorities would have to maintain a pollution budget, and all planning applications should incorporate a full Environmental Impact Assessment as a statutory requirement. Sections 78 and 79 of the Control of Pollution Act 1974 could be suitably amended to enable local authorities to require industry to provide data on fuel usage, without undue restriction. Given that sort of approach it should be possible for political decisions to be taken on industrial planning while avoiding the generally unsatisfactory American experience of trying to set national air quality standards. Mr. Rutterford agreed that a more scientific approach was required. Dr. Keddie said that if the eventual decision involved a conceptual change, from controlling individual emissions to the implementation of air quality management generally, then significant changes in COPA 1974 might be required.

Finally, the meeting noted that any proposals to control fuel usage would become a heavy political issue. Mr. Rutterford then thanked everyone for a most useful discussion on issues fundamental to the review of the clean air legislation currently being undertaken within his department — these thanks being reciprocated by Air Cdre Langston on behalf of the Society.

OBITUARIES

It is with the deepest regret that we have to report the death of three distinguished members of the Society, each of whom gave tremendous support and encouragement to the NSCA and its work, and who will be sadly missed by their many friends and admirers.

MARY GEORGE, CBE Miss George, Chairman of the Council of the National Society for Clean Air, 1975/6, was associated with the work of the Society for over 20 years. She represented the Electrical Association for Women on our Council and was for 20 years Director and Secretary of the EAW, from which post she retired in 1976. She was widely known throughout the UK electrical industry and worked tirelessly for the improvement of consumer standards in this country. She was chairman of the Consumer Standards Advisory Committee for some years and a member of the Executive Board of the British Standards Institution.

In her work for the Society she did much to promote the educational side of its activities and ensure good liaison and understanding between the Society and the electrical industry. Even after her taxing period of office as Chairman, she retained a keen interest in Society affairs, being an Individual Life Member.

Miss George received the CBE in 1974 during the Golden Jubilee year of the Electrical Association for Women. After her retirement from the EAW, she was appointed a Vice President of EAW and continued to play an active part in the affairs of the Caroline Haslett Memorial Trust.

Miss George died on July 6th 1983 aged 70. The funeral service was held at Mortlake Crematorium on Tuesday 12th July at 3 pm, at which Harry Giblin represented the NSCA.

JOYCE SAUNDERS, OBE Joyce Saunders, President of the Women's Solid Fuel Council, and since 1968 a member of the Society's Council, died at her home in Shepton Mallet, Somerset, on March 18.

Joyce joined the "Women's Advisory Council in Solid Fuel" in 1960 and played a major role in its development. When this organisation folded she formed the Women's Solid Fuel Council and became its Chairman in 1973. She was also involved with many other organisations apart from our own, such as BSI, CMS, the Consumers' Association and the National Fireplace Council. Her interest in clean air was always vital and inspiring, and in 1977 she was appointed to the Clean Air Council. She was awarded the OBE in the New Year's Honours List in 1978.

Joyce had an interesting career apart from her voluntary work for solid fuel and clean air. She took her degree (BSc) at Manchester University and for some years lectured at Watford Technical College. When, with her family, she moved to Somerset, she was appointed a lecturer at Brunel College, Bristol.

GEORGE S. STUBBS, FIEH George was a member of the Society's Council since 1961, and made an outstanding contribution to the work of both the National Society and the London and South East Division. He gave 27 years of unstinting service to the Division, as a Council member since its first meeting, and more particularly as Honorary Minute Secretary. The Division celebrated his unique efforts with the presentation of a special award in 1980. In 1981, he was elected to Honorary Life Membership of the Society.

George's professional career was in the field of public and environmental health, and he maintained a special interest in air pollution control. He retired as a Divisional Public Health Inspector.

George will be greatly missed by the Society as a whole, and by the London and South East Division in particular. At the funeral service, held at the Church of Our Lady of Lourdes, Wanstead, on 14 July, the Society was represented by the Secretary General, and the Division by Alan Rees and Mrs. Naylor, with many other friends from the Society also present. Our deepest sympathy goes to his wife, Connie, and to his son and daughter.

AWARD FOR POLLUTION PROBLEM SOLVERS

The Pollution Abatement Technology Award 1983 was launched on 27th July 1983. This new award scheme is intended to identify, encourage and publicise innovations in technology to abate environmental pollution of all kinds. It is open to all: industry, universities, colleges, institutes, agencies and individuals (provided that they are based in the United Kingdom). The technological advance may be at the stage of a study or prototype, or may recently have been put into operation.

The two classes of entry are: a) practical studies, including drawings and prototypes which have not been applied commercially before the announcement of the competition on 27th July 1983, and b) technology introduced since 1st January 1980 and the application of existing technology in a new way during the same period. Entries will be judged by the extent to which they achieve environmental benefits, or are innovative and make economies or improve efficiency. Entries could be concerned with anything from making animal bedding from waste paper, to the control of effluent from waste-disposal sites.

Sponsors for the Award are the ERAS Foundation and the promoters are the CBI, the Department of the Environment and the Royal Society of Arts. The Award will be an annual scheme, and results of the first year will be announced in March 1984.

Details of the scheme are set out in a brochure available from: Timothy Cantell, Royal Society of Arts, John Adam Street, Adelphi, London WC2N 6EZ. Entries should be submitted to the Award Secretariat at that address not later than 31st October 1983 (applications will be acknowledged). Entries must be made on an official entry form but supporting documents, drawings and photographs may also be submitted.

BRITAIN'S ENVIRONMENTAL PRIORITIES

A MORI poll conducted earlier this year shows that pollution and resource depletion are major concerns for a significant number of people in Britain. Well over half of those polled said they would support an increase of 1p in the £ on income tax to pay for effective measures to ensure less waste of natural resources, or to pay for measures to protect wildlife and the environment.

Most encouraging for the Society is the high level of importance attached by those surveyed to an unpolluted atmosphere. Asked what makes a valuable contribution to the overall quality of life, 51% felt that an unpolluted atmosphere was a priority (overall, third in importance) and only 3% considered it did not matter. This finding indicates that the Society has done well in publicising the dangers to health and loss of amenity caused by air pollution, and gives hope for a wide level of support in the future for the Society's activities.

The MORI survey was commissioned by the Countryside Commission and the World Wildlife Fund on behalf of the organising committee of the Conservation and Development Programme for the UK. This, Britain's response to the World Conservation Strategy, was launched in London with the assistance of HRH The Prince of Wales on June 8th.

The World Conservation Strategy was published in 1980 and it took three years to prepare Britain's programme — an impressive document of some 500 pages together with a separate overview entitled "Resourceful Britain". The main volume has seven major reports, covering industry, urban life, the countryside, marine and coastal protection, the UK's environmental policy overseas, environmental ethics and environmental education. From these reports, ten main principles of action were derived, which, together with many more specific recommendations, collectively offer a programme to ensure conservation and development within a dynamic economic and industrial infrastructure. However, the success of the programme will depend on changes in public attitude and policy necessary to create a framework within which the recommendations can flourish.

Discussion of air pollution issues is scattered throughout the report, with emphasis on the successes of clean air legislation in the UK, and on major international problems, e.g. climatic change in relation to a build-up in carbon dioxide, and acid precipitation. On SO₂ emissions, the conclusion is that while the implications are not wholly proven and may be indirect, there are sufficient links between the UK's resource-consumption pattern and the degradation of some of the world's major living systems to argue for a change in attitudes and practices.

On the industrial side, the report entitled "Seven Bridges to the Future" summarises the many ways in which pollution control, resource recycling, coherent energy use and a new approach to industrial strategy can create new wealth and new jobs, as is already happening within the pollution control equipment manufacturing sector.

"The Conservation and Development Programme for the UK. A Response to the World Conservation Strategy" is published by Kogan Page at £14.95. For further information on work related to the World Conservation Strategy, contact the World Wildlife Fund — UK, Panda House, 11-13 Ockford Road, Godalming, Surrey, GU7 1QU. Telephone: Godalming (04868) 20551.

NEW FIREPLACE EXEMPTION

The Smoke Control Areas (Exempted Fireplaces) (No. 3) Order 1983 exempts the fireplace known as the Trianco "Coal King" boiler, manufactured by Trianco Redfyre Ltd, from the provisions of Section 11 of the Clean Air Act 1956. The order applying to England and Wales came into operation on the 17th August 1983. (SI No. 1018, 1983 pub. HMSO, 35p net.)

FUTURE EVENTS

UK 1983

18 - 19 October "Industrial Economic Reality" — Combustion Engineering Association, 1983 Conference and Exhibition. The Grand Hotel, Eastbourne. Papers by industry and university experts will be presented on factors contributing to the efficient use of fuel, including developments in combustion control, use of computers, and fuel use in specific industries. Keynote Speech will be given by Lord Ezra.

Fees: £97.75 for members, £115 for non-members.

Details: Jack Greenhalgh, Director, CEA, Mount Lodge, Station Parade, Sunningdale, Berks. SL5 0EP. Telephone: (0990) 25035.

30 November Removal of Particulate Matter from Air. 1 day Symposium, organised by the Society of Chemical Industry, Water and Environmental Group. SCI, 14 Belgrave Sq., London. Programme covers legislative requirements, local authority enforcement (paper by Dave Clark of Middlesborough B.C.), selection of equipment, wet scrubbers, electrostatic precipitators and bag filters.

Details: Mr. G. Fuller, Borax Holdings Limited, Borax House, Carlisle Place, London SW1P 1HT. Telephone: 01-834 9070.

The SCI's Water and Environment Group are organising another one day symposium on **18 January 1984, covering "Odour Nuisance: the Law, Impact and Abatement"**. This will be held at the SCI, 14 Belgrave Square, London SW1. Provisional Programme and details from G. Fuller, address as above.

2 November The Handling of Dusty Materials in Ports. One day Symposium. Organised by the British Materials Handling Board. City Conference Centre, London. A repeat, by request, of a previous symposium, held on 18 May 1983. Speakers will include public and private port operators, HSE, EMAS, ASAPHA and equipment manufacturers.

Fee: £80.00, which includes a copy of the recently published Guide 'The Handling of Dusty Materials in Ports: Impact, Prevention and Control' (already sold in 10 countries).
Details from: BMHB, Index House, Ascot, Berks. SL5 7EU. (Tel: 0990 23377).

8-9 November Energy and our Future Environment. 2 day Conference. Organised by The Institute of Energy. To be held at the Bloomsbury Crest Hotel, Coram Street, London WC1.

Details and Registration Form: The Institute of Energy, 18 Devonshire Street, London W1. Telephone: 01-580 7124.

Short Courses The Centre for Extension Studies, Loughborough University of Technology, are holding 3 short courses on environmental subjects in October and November: **Hazardous Waste Treatment and Disposal**, 25 - 27 October, **Worker Risks from Noise Exposure**, 7 November, and **Noise Control and the Protection of Hearing at Work**, 8 - 11 November.

Details: Sonia Withers, Centre for Extension Studies, University of Technology, Loughborough, Leicestershire LE11 3TU. Telephone: Loughborough (0509) 263171 Ext. 213 and 249.

OVERSEAS CONFERENCES, 1984

8 - 12 February Envirotec 84, Bombay, India. India's largest exhibition and conference of environmental technology for pollution control and monitoring, sponsored by the CHEMTECH Foundation.

Details: Mr. Indra Mohan, Secretary General, CHEMTECH Secretariat, 210 Dr. DN Road, Taj Building, 3rd Floor, Bombay 400 001. Telephone: 262044 Telex 011-3757 JSGR IN

28 May - 1 June 25 years of International Collaboration and Experience in Noise Control 13th AICB Conference. Sarajevo, Yugoslavia. Organised by the International Association Against Noise, in association with the Yugoslav Soc. of Noise and Vibration Control.

Details and preliminary registration form: Jane Dunmore, NSCA, Brighton.

August 20 - 24 3rd International Conference on Indoor Quality and Climate (Indoor Air 84). Stockholm, Sweden. Organised by the Karolinska Institute/National Institute of Environmental Medicine and sponsored by EHO, CEC and others.

Details: Indoor Air 84, Reso Congress Service, F-105 24 Stockholm, Sweden.

Telephone: International plus 46 8 201662 or 144910. 3 - 7 September 1984.

23 - 25 October 1984 6th International Conference on Air Pollution. Pretoria, South Africa. Organised by The South African National Association for Clean Air and the Council for Scientific and Industrial Research. The theme is "Air Pollution: Implications and challenges". Programme covers research, medical aspects, technology, energy, environmental planning, impact, community administration, legislation and public reaction.

Details: The Symposium Secretariat, S. 333 CSIR, PO Box 395, Pretoria, Republic of South Africa 0001. Telephone: Pretoria (012) 86-9211 Extension 3576 or 7077.

INDUSTRIAL NEWS

Asbestos Approval for RACAL Mask

Asbestos and lead approvals from the Health and Safety Executive have now been received by Racal Safety Limited for its highly successful, low cost Aircare 5051 Dustmask.

The mask conforms to BS6016 type 2 and has been found suitable under Asbestos Regulations 1969 and Lead Regulations 1980.

An extremely comfortable mask, the Aircare 5051 has twin straps enabling a good face seal with low breathing resistance. It is ideal for general and heavy industrial use and folds flat for carrying in the user's pocket.

This latest approval follows one received for the modified version of the award-winning Racal Airstream Helmet, the AH4 GB2. Incorporating a performance indicator, the helmet meets the 1969 Asbestos Regulations (as amended in January 1983).

With these approvals and those expected shortly for the new Dustmaster and Breathe Easy ranges of powered respirators, a wide variety of products is offered by Racal Safety to aid productivity when handling asbestos and other toxic dusts. Reader Enquiry Service No. 8319

U.S. Appeals Court Confirms Safety Ruling on Cavity Foam Insulation

The U.S. Consumer Products Safety Commission has failed in a bid to re-open an Appeals Court case which found that cavity foam insulation was no risk to health.

On 7 April, the U.S. Court of Appeals for the 5th Circuit overturned a ban which had been improperly imposed by the CPSC during 1982 and said that it "was not supported by substantial evidence". The CPSC petitioned for a rehearing on 6 May, as permitted under U.S. law. On 24 June, the Court ruled that the case would not be re-opened and that it would formally lift the ban on 1 July.

Mr. Paul Denham, chairman of the U.K. Cavity Foam Bureau, said: "This ruling is a categoric assurance that foam is safe and it should close the book on one of the saddest and most worrying episodes in the history of consumer protectionism. There is now no excuse for anyone in Britain to ignore medical science in claiming that cavity foam insulation is anything but a safe and very cost effective form of energy conservation for householders and local authorities."

Reader Enquiry Service No. 8320

New Czech Pollution Control

A new method of reducing emissions of nitrogen oxides has been developed at the Institute of Inorganic Chemistry of the Czechoslovak Academy of Sciences and Chepos, Chemical Installations Research Institute.

The method of selective catalytic reduction changes nitrogen oxides into a harmless gas. In numerous laboratory tests, best results were achieved with vanadium catalysts. A device designated 'Renox 604' was developed and built which reduces by more than 90 per cent the content of nitrogen oxides in 120,000

cubic metres of gaseous emissions per hour. The installation of the device requires no changes to be made in the production process in chemical plants. There has already been considerable interest abroad in the emission-reducing device.

The installation of the device in the North Bohemian chemical complex in Lovosice reduces nitrogen oxides emissions by more than 4,000 metric tonnes a year, and prevents direct damage estimated at £700,000 a year.

Reader Enquiry Service No. 8321

First Woman in the Chair

Diane Brown, the Chemical Industries Association Environment Executive, was elected chairman of the Society of Chemical Industry's Water and Environment Group in May 1983. She is the first woman to chair this group and will serve for two years.

Mrs. Brown has worked for CIA since 1975. A qualified chemist, she is Secretary of the CIA's Environment Advisory Group and represents CIA on environmental matters before British Government and in Europe.

Among the projects in which she has recently been involved is the production of a booklet called "We Care About Waste". It explains for the benefit of non-chemists how the industry adopts a responsible and caring attitude to waste disposal.

In her new role Mrs. Brown will steer the group's work on all aspects of water and the environment. This will involve staging symposia and generally ensuring an interchange of ideas on environmental matters.

Commenting on her election she said: "I have already served on the SCI's Water and Environment Group for 4 years. Now, as its chairman I hope to make a greater

contribution to the very important matter of environmental protection."

Reader Enquiry Service No. 8322

Text-book success as Envirocor solves Lambeth High-rise Asbestos Problem

Envirocor Limited of Hixon, Stafford, a Member of the Asbestos Removal Contractors Association and pioneer of the high power vacuum asbestos removal method, has recently completed a major asbestos removal contract under taxing conditions.

Coverley Point and Haymans Point are adjoining 12 storey composite blocks of council flats and maisonettes located a few hundred yards south of the Thames at Tyers Street, Lambeth. Entrance to the maisonettes is via lifts into internal two storey corridors.

Site Preparation

Before stripping commenced, each two storey corridor was scaffolded and a working platform built some 6' 6" from ceiling height, leaving uninterrupted access below for the residents. The platform comprised a basic batten base, over which was laid a layer of heavy duty polythene, hardboard sheets, then a final sealing layer of polythene. The edges of both polythene sheets were returned 6" up the walls and sealed with tape in order that no asbestos could escape to the maisonette hallways below. Windows and ventilators at one end of each corridor were, similarly, meticulously boarded and sealed.

Overlooking the work platform at the opposite end was a balcony leading to lift doors and entrances to single storey flats: this area provided a ready-made location for the Company's three stage entry-exit air locks. These were constructed using

slotted angle and polythene sheeting; to prevent unauthorised access, these were totally enclosed by timber panels, with tape sealed joints and a lockable door. In addition to forming a positive seal against fibre release, the timber encapsulation protected the work area against vandalism. The whole unit could also be easily dismantled for re-erection at successive work areas.

Removal Procedures

The stripping and removal process was conducted by a team of four men stripping and removing asbestos by vacuum. In bright red hooded 'working' overalls, gloves, boots and positive pressure respirators, their first task was to take down the battened polythene sealing layer, applied to the ceiling by Lambeth Council's own direct labour force when the asbestos was first discovered. This now unwanted material was bagged, sealed, and the bag outsides de-contaminated before being removed to a specifically designed lockable skip for eventual safe disposal. Stripping then commenced.

The asbestos, says Envirocor, was not difficult to remove; hand scrapers were used to dislodge the bulk material and a final wire brushing cleared the surface of loose fibres. Envirocor utilised their latest 60 H.P. electrically driven high power vacuum unit developed and built by the Company's own engineers, and designed specifically for use in densely populated or built-up areas. The machine's low noise level is appreciably more acceptable than those of the Company's larger 100 H.P. diesel units.

The plant, thought to be internationally unique, was located at ground level and linked to each work area via 100mm. flexible air-tight pipework running up the outside of the buildings and entering the

work areas through pipes sealed in the air lock walls.

Inside the work area, the vacuum pipe was sheathed and sealed in polythene to eliminate the trapping asbestos fibres within its flexible spiral outer casing.

Following the removal of bulk asbestos, the entire area was then subjected to a second thorough vacuuming and de-contamination process to reduce the fibre count to the 'acceptance' level of 0.02 f/ml. Upon attaining this level, the polythene sheeting was bagged, sealed and removed for disposal, and the final process of coating the ceiling with 'Artex' compound, carried out.

Throughout the contract, three teams of men were employed in order to maintain a continual workflow. As Team One was stripping, Team Two prepared the next work area for treatment whilst Team Three removed sheeting, dismantled air locks, and applied the Artex coating.

Leaving the Work Area

The procedures adopted by Envirocor personnel upon leaving the work area, as always, followed the Company's Code of Practice. The overalls of each stripper were thoroughly vacuumed utilising the extremely high suction of a 50mm. diameter branch off the main 100mm. hose. Entering the 'dirty' side of the three-stage air lock, all contaminated clothing and footwear was removed and sealed into bags for despatch to a specialist, approved launderer.

Operatives then entered the second stage of the air lock, passing through an anti-septic foot bath and sealing respiratory equipment into plastic bags prior to its final decontamination.

In the third, and 'clean' stage of the air lock, clean white overalls were donned. These garments are always of a different

colour to those worn in the work area; this gives visual assurance that contaminated work overalls, 'reds' as they are known, do not leave the area unless bagged. To ensure that a high level of control was achieved during the exit procedure, throughout the contract, check fibre counts were taken in the final stage of the air lock.

The 'live' situation at Lambeth determined that the air lock entrance door was securely locked, from the inside, to prevent unwanted intrusion whilst stripping was in progress.

Personnel Decontamination

Adjacent to the plant installation was located one of the Company's purpose built personnel decontamination units which, again, remained locked when not in use. Entering the 'dirty' side, employees removed transit overalls and left respirators with their supervisor for final cleaning and battery re-charge. Within the second section, men showered, washing their hair thoroughly and brushing fingernails before passing into the third 'clean' stage containing either clean overalls or street clothes.

Each section of the decontamination unit is isolated by self-closing doors and a forced air flow from the 'clean' to the 'dirty' section eliminates any contamination of the former.

Plant

The 60 H.P. electrically driven Envirocor vacuum plant is compact, quiet and designed by the Company for all noise sensitive situations such as the Lambeth

buildings. Its dual stage filtration system is unique, automatically self de-dusting on a closed cycle system. Filters never need be removed on site, nor is the dust transferred to bags at any stage. Independent tests using the latest techniques of Condensation Nuclei Testing have proved that no measurable asbestos contaminant is exhausted to the atmosphere.

Prior to air passing through the machine's filtration system, all material and dust is collected in vacuum tight skips, within which it is slurried for eventual disposal at the nearest approved tip.

In order to reduce the risk of the plant being damaged, resulting in possible contamination, the entire Lambeth plant installation was caged in heavy duty wire mesh and protected constantly at night by a professional security company.

Success

"The contract", says Envirocor, "ran extremely smoothly, with Lambeth Environmental Health Officers and our own staff co-operating to ensure a successful operation. Air count readings were consistently within Lambeth's specified control limit of 0.02 f/ml in spite of the fact that, at times, an **unprecedented 36 air counts per day** were taken by independent analysts, resident on site and working from a temporary laboratory within a vacant flat. Not a single complaint was registered by residents and the complete contract of 10 ceilings, scaffolded, isolated, stripped and Artex coated, was completed in just 14, single shift days, without disrupting the daily routine of the tenants."

Reader Enquiry Service No. 8323

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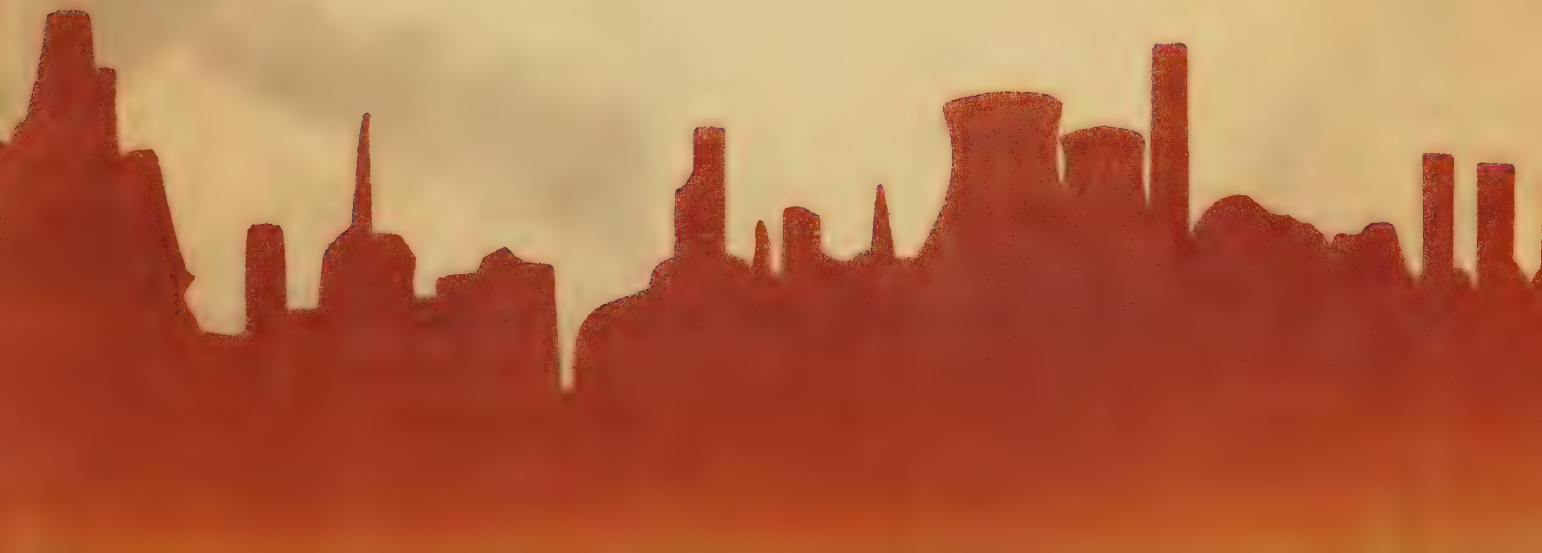


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AGRICULTURE AND POLLUTION

When late (as this issue regrettably is) an unobtrusive and apologetic entrance is usually more appropriate than flamboyant self-advertisement. But the Government carried modesty too far when they issued their long-awaited response to the Royal Commission on Environmental Pollution's 'Agriculture and Pollution' report, just before Christmas. Published at such a time, few could acquire Pollution Paper No. 21, let alone analyse and comment upon it to immediate effect.

In the four years which have elapsed since the Royal Commission reported, many of the issues on which this Society expressed views have been widely debated within and outside its membership, and concern about the impact of farm wastes has intensified and become widespread. The Government, in this response, accept that agriculture should be expected to shoulder its environmental responsibilities — but reject specific suggestions which would have brought agriculture into line with other industry. For example, the Royal Commission's recommendation that intensive livestock units should be subject to specific planning control is sidestepped in favour of amendments to the General Development Order, which will focus on the siting of intensive livestock units near residential and other property. The possibility of anticipatory powers to prevent odour nuisance is suggested in a reference to the long-running review of statutory nuisances: more concrete information on this point should emerge from the discussion at the NSCA's Spring Workshop.

As for straw and stubble burning, the Government "consider that scope exists for further strengthening of the Code and of the model byelaw and action to this end is in hand": hardly an adequate response to the public outcry about the pollution and destruction resulting from the practice. The NFU itself would now, it seems, support the introduction of licensing — only Government persist in believing that byelaws alone can regulate straw and stubble burning successfully. Their faith is ill-founded, since byelaws have consistently proved difficult or impossible to enforce, and offer no redress to those affected by air pollution spreading across local authority boundaries. Only national legislation which affords a simple means of prosecution for an absolute offence offers the prospect of ameliorating problems until a ban can be put into effect.

To be fair, there are crumbs of comfort in PP21. Importantly, the assurance of increased commitment to research into the effects of air pollution on agriculture is most welcome, as is the general message that increased emphasis will be given to pollution matters by the agriculture Departments — without diminishing the role of the environment Departments. Put out more flags.

LONDON'S AIR QUALITY: THE VALUE AND USE OF A COMPUTER DISPERSION MODEL

Colin J ARMORGIE, David J BALL & Duncan P H LAXEN*

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INTRODUCTION

In 1980 the Council of European Communities passed a Directive on air quality 'limit' and 'guide' values for sulphur dioxide and suspended particulates (1). The ability to meet the directive will depend upon a number of factors, including rates of sulphur dioxide emissions into the atmosphere from a variety of sources, the heights at which these emissions occur, and the meteorological conditions in the locality of the emissions. Monitoring atmospheric concentrations is one means of assessing our ability to comply with an air quality objective. This, however, is a retrospective approach, leading to a response after the event; it also requires 'judgements' as to where to monitor. In contrast, the use of a computer dispersion model provides a means of estimating the consequences for air quality over a region of a whole range of different developments, for instance, an altered pattern of sulphur dioxide emissions. This ability to foresee the effects of future changes is an invaluable aid in the rational development of effective strategies to safeguard air quality. Such a model can also help identify those areas most at risk of infringing 'limit' and 'guide' values, thereby allowing the most appropriate monitoring programme to be instituted.

In this paper we report the application of a computer dispersion model to the calculation of ground-level sulphur dioxide concentrations in London. The ability of the model to simulate historic trends in sulphur dioxide concentrations is first examined, and then the use of the model to predict the effect of alternative fuel use patterns on sulphur dioxide concentrations is demonstrated. Fuel use patterns play an important role in determining sulphur dioxide concentrations due to the range of sulphur contents of different fuels (Table 1). We will explore two illustrative scenarios of fuel use change, both involving increased coal burn, to illustrate the power of the technique. The first will involve all plant using fuel oil (except power stations run by the CEGB) changing to the use of coal. The second will substitute coal for gas oil. The former represents a decrease in sulphur emissions, the latter an increase.

METHODOLOGY

The computer model used in this study was the United States Environmental Protection Agency Climatological Dispersion Model, which is described fully elsewhere (2). It is of the Gaussian plume type and calculates long-term ground-level mean concentrations of essentially non-reactive pollutants in an urban area. It requires information on Meteoro-

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logical conditions and pollutant source characteristics. The pollutant source characteristics in this case have been based on the comprehensive sulphur dioxide emission inventory for London in 1975/76 (3), updated for central London in 1978/79 (4). Two source types are considered; point sources, classified in this case as sources emitting more than 30 tonnes sulphur dioxide per annum, and area sources. Mobile sources cannot be separately entered into the model. In the present context they have been omitted from further consideration as vehicles have been calculated to contribute less than 3% to total sulphur dioxide emissions (5). In terms of the 'National Survey of Air Pollution' sites, to which the present study will refer and which are all located away from major roads, traffic emissions of sulphur dioxide (but not smoke) can be safely disregarded. This is not to say, however, that sulphur dioxide emissions from traffic may not be of local importance.

Table 1 Approximate Sulphur contents of Major Fuels

Fuel	Percent Sulphur (by weight)
Fuel Oil	2.8 – 3.0
Bituminous Coal	1.0 – 2.0
Solid Smokeless Fuel	1.0
Gas Oil	0.5 – 0.7
Derv	0.35
Motor Spirit	0.04
Gas	0.00

The meteorological input consists of a joint frequency function, which gives the frequency of wind direction by speed class and atmospheric stability category. In addition information on the mean temperature for the period being modelled is required, as well as on mixing heights. The wind and stability data were based on Meteorological Office recordings at Heathrow. The temperatures were recorded at the London Weather Centre in central London. Mixing heights were set for the six different stability categories used in the model. These ranged from 650 m for the equivalent of Pasquill stability class A to 150 m for the equivalent of stability classes E and F. Mixing height will in reality fluctuate continuously, thus this simplification could account for some of the differences between calculated and measured concentrations (5).

The model was used to calculate ground-level sulphur dioxide concentrations at locations corresponding to National Survey sites in London. This allows a comparison to be made between observed and calculated sulphur dioxide concentrations at these sites.

In the historical simulation ground-level sulphur dioxide concentrations were calculated for the winter periods 1965/66, 1970/71, 1975/76 and 1980/81. The basic emission inventory data collected for 1975/76 (3) and 1978/79 (4) were extrapolated to the other years of interest, making allowance for gross changes in fuel use patterns, as well as additions or losses of point sources and changes in area source distribution, where information was available. This procedure is clearly not as reliable as using a comprehen-

sive emission inventory for the years in question. Fuller details of the model inputs are given elsewhere (5,6).

RESULTS AND DISCUSSION

Simulation of Historical Trends, 1965-1980

The comparison of observed and calculated mean winter ground-level sulphur dioxide concentrations is summarised in Table 2 and Figure 1. There was a reasonably good agreement, although with a tendency for the model to overestimate measured concentrations by about $25 \mu\text{g m}^{-3}$. The correlation coefficient for the observed and calculated values using the 1975/76 data set (82 sites) was 0.86, which is comparable with results from other studies (7). The model predictions, however, were less accurate for the other years. This is not unexpected given the less reliable nature of the extrapolated emissions.

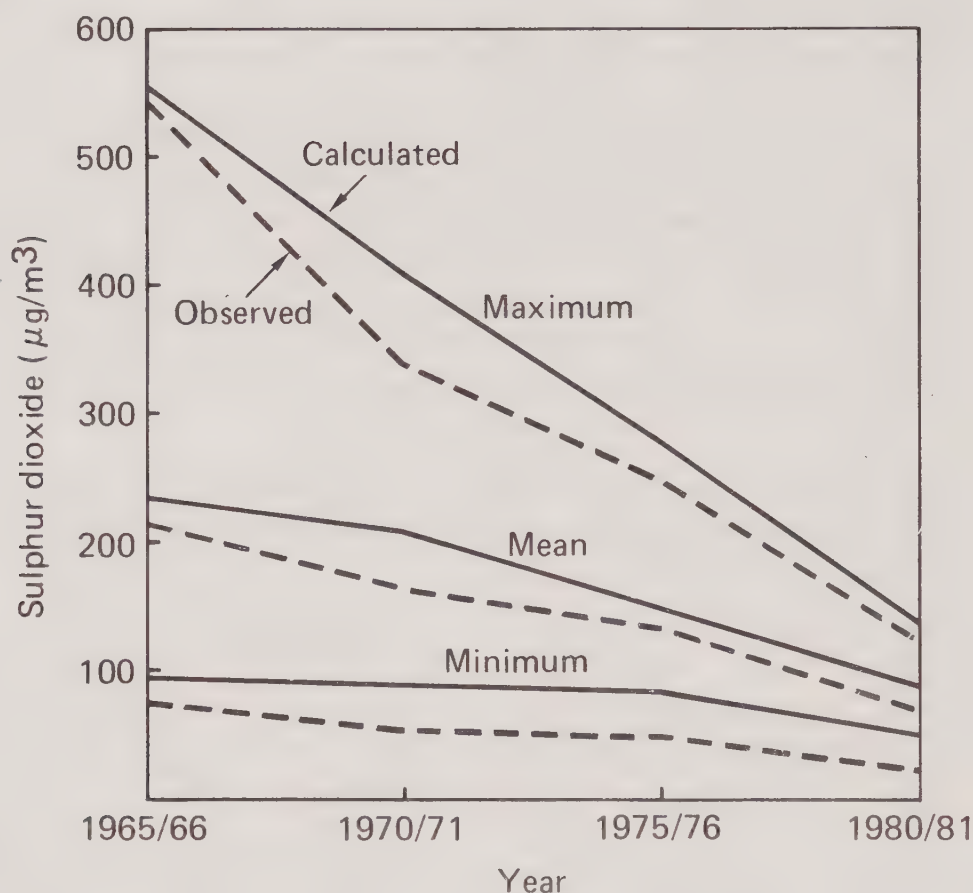
Table 2 Mean and Ranges of Observed and Calculated Ground-level Winter Mean Sulphur Dioxide Concentrations ($\mu\text{g m}^{-3}$) at National Survey Sites in London, 1965-1980

Year	No Sites	Mean		Maximum*		Minimum*	
		Observed	Calc	Observed	Calc	Observed	Calc
1965/66	83	215	238	549	556	77	96
1970/71	99	167	211	345	407	57	92
1975/76	82	134	148	250	280	48	88
1980/81	56	69	90	127	143	24	49

* The observed and calculated values do not necessarily occur at the same site

By 1980/81 area sources were found to be contributing 59% on average (range 37-70%) to ground-level sulphur dioxide concentrations, even though area sources only represented about 40% of total emissions. This is undoubtedly due to the greater emission height of point sources. It is worth adding in this respect that using the 1975/76 data it was found that a doubling of the height of all point source emissions reduced average ground-level sulphur dioxide concentrations by about 14% even though point sources at that time accounted for about 68% of the emissions (5). A similar conclusion is reached in a more recent modelling exercise carried out for sulphur dioxide in London by Warren Spring Laboratory (8). This demonstrates the limited additional benefit that can be derived from the policy of increasing point source emission heights, as contained in the Chimney Height Memorandum. Indeed this point and other limitations of current sulphur dioxide emission controls were taken up at a meeting earlier this year between representatives of the National Society for Clean Air, the Department of the Environment and Warren Spring Laboratory (9). It is now clear that some other form of control strategy will be necessary to safeguard London's air quality (10).

Figure 1 Observed and Calculated Ground-level Winter Mean Sulphur Dioxide Concentrations at National Survey Sites in London, 1965-1980. The calculated and observed maximum and minimum values do not necessarily occur at the same sites.



Changing Fuel Use Patterns

The implications for sulphur dioxide concentrations of two fuel use scenarios have been examined, using 1980/81 as the base year, leaving all other factors constant. The intention has been to test the sensitivity of London's air quality to significant changes in fuel use patterns. The two scenarios are illustrative and are not intended as rigorously developed predictions of possible future events or possible future policies. Concentrations of sulphur dioxide calculated for these two scenarios are compared with those calculated by the model for the 56 National Survey sites in operation in London in 1980/81. The basic pattern of calculated ground-level concentrations for 1980/81 is shown in Figure 2.

Scenario 1 involves a complete change from the use of fuel oil to the use of coal (except in power stations). This represents a change from a high sulphur fuel (taken to be 2.8%) to a lower sulphur fuel (taken to be 1.5%). Fuel oil is primarily used in larger plant and the associated sulphur dioxide emissions therefore occur principally as point source emissions from industrial and commercial sites. (Point sources account for 73% of sulphur dioxide emissions from fuel oil burning). The effect of this scenario is to increase coal burn by 1.06 million tonnes per annum, a 114% increase, with an associated *reduction* in sulphur dioxide emissions of 11,000 tonnes per annum, a 14% reduction.

Figure 2 Ground-level Winter Mean Concentrations of Sulphur Dioxide in London as Calculated for 1980/81. The isopleths are at $10 \mu\text{g m}^{-3}$ intervals up to $160 \mu\text{g m}^{-3}$.



The average *decrease* in winter mean ground-level sulphur dioxide concentrations is calculated to be $10 \mu\text{g m}^{-3}$ or 11% with a range for the different locations of 6-14%. The effect on the areal distribution of sulphur dioxide concentrations is shown in Figure 3. The change is greatest in areas with the highest concentration of point sources.

Scenario 2 involves a wholesale substitution of gas oil by coal, representing a change from a low sulphur fuel (taken to be 0.5%) to a higher sulphur fuel (1.5%). Gas oil is used in smaller units and therefore contributes principally to emissions on an area source basis. Coal burn in this scenario increases by 1.84 million tonnes per annum, a 198% increase, this time leading to an *increase* in sulphur dioxide emissions of 38,000 tonnes per annum, a 47% increase. The effect is to *raise* winter mean ground-level sulphur dioxide concentrations by an average of $47 \mu\text{g m}^{-3}$ or 50%, with a range from $11 \mu\text{g m}^{-3}$ on the western edge of London to over $170 \mu\text{g m}^{-3}$ in central London (Figure 4). This additional sulphur dioxide would result in significant areas of London exceeding the $180 \mu\text{g m}^{-3}$ winter median EC Directive 'limit value' for sulphur dioxide (smoke less than or equal to $60 \mu\text{g m}^{-3}$) or even greater areas exceeding the more stringent limit value for

Figure 3 Change (Decrease) in Calculated Ground-level Winter Mean Sulphur Dioxide Concentrations under Scenario 1. The isopleths are at $5 \mu\text{g m}^{-3}$ intervals up to $160 \mu\text{g m}^{-3}$.



sulphur dioxide of $130 \mu\text{g m}^{-3}$ if the uncontrolled increase in coal burn pushed the smoke values above $60 \mu\text{g m}^{-3}$. Larger areas still would exceed the 'guide values'.

CONCLUSION

We have demonstrated in this study an ability to relate trends in ground-level sulphur dioxide concentrations in London to emission patterns using a computer dispersion model. The input of emission rates to the model was derived from a detailed emission inventory carried out jointly by the London Boroughs and the Greater London Council in 1975/76 and 1978/79, with extrapolation to the other years of interest. The agreement between calculated and observed sulphur dioxide concentrations was good for the base year 1975/76 but not as good in the years for which the data were extrapolated. This points to the importance of routinely updating emission inventories in order to retain their full value, especially during a period of rapidly changing fuel use patterns, as has been witnessed in London over the last decade or so. In this respect a comprehensive update for London of sulphur dioxide emissions is currently underway. This new emission inventory will include other pollutants of concern.

Figure 4 Change (Increase) in Calculated Ground-level Winter Mean Sulphur Dioxide Concentrations under Scenario 2. The isopleths are at $20 \mu\text{g m}^{-3}$ intervals, up to $+160 \mu\text{g m}^{-3}$.



The results for the two illustrative fuel use scenarios demonstrate the value of computer dispersion models in being able to anticipate the effect of fuel use changes on ground-level concentrations. Substitution of coal for fuel oil or gas oil is calculated to have a significant effect on sulphur dioxide concentrations. In the former case the result is an average 11% fall in mean winter concentrations at the 56 sites considered, while in the latter there is a 50% increase. Clearly an increased coal burn does not, *per se*, lead to increased sulphur dioxide pollution. Furthermore, a fairly small change in sectorial energy use patterns — fuel oil and gas oil accounted respectively for only 6% and 10% of energy consumption in London in 1980 (6) — is calculated to have a profound effect on ground-level sulphur dioxide concentrations and may be of importance in determining the ability of an urban area to meet air quality limit and guide values.

ACKNOWLEDGEMENTS

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 7. Brubaker K.L., and Rote D.M. *Dispersal Models for Sulphur Oxides in Urban Environments*, in 'Sulphur in the Environment' J.O. Nriagu (Ed.), John Wiley & Sons, New York, 1978.
 8. Spanton A.M. Dispersion Modelling of Sulphur Dioxide Concentrations in London With Reference to the EC Directive Limit Values, *WSL Rept. LR 457 (AP) M*, Warren Spring Laboratory, Stevenage, 1983.
 9. National Society for Clean Air Future Coal Use and the Adequacy of Existing Legislation, *Clean Air*, 13, 113, 1983.
 10. Greater London Council Sulphur Dioxide and Smoke in London, *Minutes of Council Proceedings*, 20 July 1982, Item 18, p 32, Greater London Council, London, 1982.
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FUTURE EVENTS

Oxford (UK) — Environmental Toxicity — Fact and Fiction April 2, 3 and 4 1984. Held by AERE, Harwell at St. Catherine's College.

Details: Mr. Les Evans, Education and Training Branch, Harwell Laboratory, Didcot, Oxon OX11 0RA. Tel: 0235 24141, ext. 3106.

Major Conference on Alternative Energy Sources The 4th International Conference on *Energy Option — The Role of Alternatives in the World Energy Scene* will be held at the Institution of Electrical Engineers, London WC2 from 3-6 April 1984.

Details: Conference Services, IEE, Savoy Place, London WC2R 0BL. Tel: 01-240 1871, ext. 222.

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ACID RAIN: PROGRESS IN ADDRESSING THE ISSUE

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Introduction

Addressing the acid rain issue involves a complicated mixture of scientific and policy problems and people and interests. It requires a careful sorting of all these in deciding what the public interest dictates.¹ The basic question that is confronted in the United States is whether to augment the current U.S. Clean Air Act control requirements in the light of our present scientific understanding and the available estimates of environmental damages from acid rain. The objective of this paper is to shed light on the scientific and policy issues involved in acid rain.

Scientific Issues

In June 1983, three major scientific reports on acid rain were released.² The report of the National Acid Precipitation Task Force concluded that over 90 percent of acid rain in the Northeast and Canada came from man-made sources. The report of the National Research Council of the National Academy of Sciences (NAS) concluded that over a broad region and over a long period of time, a reduction in SO₂ discharges will result in a proportional reduction in the deposition of sulfates (SO₄). The NAS concluded that acidic deposition in the East varies directly with emissions of SO₂ from local and upwind sources. The third report by the White House Science Advisor's Panel recommended that additional reductions in SO₂ discharges be undertaken now in order to avoid the possible irreversible damage to the environment. The report argued that if the view is taken that we must wait until the scientific knowledge is definitive, the accumulated deposition and damage to the environment may be irreversible. Despite the fanfare that accompanied these reports, they cannot be considered conclusive.

The amount of acidic materials formed in the atmosphere is heavily affected by a number of factors. Oxidation is the fundamental process that converts the SO₂, the primary pollutant, into SO₄, a secondary pollutant. One theory about SO₂ transformation in industrial areas suggests that the amount of SO₂ converted to SO₄ may be more heavily affected by the amount of oxidant in the atmosphere than by the actual amount of SO₂ discharged. If this is correct, increases or decreases in discharges of SO₂

Any opinions, findings, and conclusions or recommendations in this paper are those of the authors and do not necessarily reflect the views of the President's Council on Environmental Quality or Southwestern University at Memphis.

in one region may not have a significant effect on SO_4 produced and hence on the amounts deposited in a distant region.

Atmospheric processes are not simple, straightforward or well understood. Many shortcomings are evident in the available data. Limited knowledge exists on the transport of the precursors to acidic deposition, their physical and chemical transformation, and the processes by which the sulphates and nitrates are deposited. Yet, an objective review of the science leads to the conclusion that there are certain general statements on which many, but not all, scientists would agree. Exhibits 1 and 2 illustrate the status of our understanding of acid rain:

Exhibit 1

The Nature of the Problem

- On a long-term average basis, sulphur is thought to be dominant contributor to acidic materials.
- Nitrate deposition often dominates the acidity released during spring snow-melts in the Northeast and West.
- Little is known about the reversibility of possible damage to aquatic and terrestrial ecosystems, but the potential for future irreversible damage is possible.
- Significant increases in environmental damage from acidic deposition are likely to take decades, not years.
- The Clean Air Act has reversed the growth in sulphur oxides emissions, and slowed the growth in nitrogen oxides emissions, particularly in the East.
- Sulphur oxide emissions trends are relatively flat throughout the century and are expected to decline after 2000. Nitrogen oxide emissions trends are up unless more control is placed on new sources.
- Sulphur emissions reductions over a broad area (e.g., eastern North America) and over several years may reduce acid deposition rates proportionally averaged over the entire region.
- Acid deposition attributable to a given source will decrease as distance between source and receptor increases.
- Existing models and data analyses can give a qualitative sense of the relationship between source areas and receptor areas, but they cannot accurately predict the effects of specific sources on specific receptors.

Exhibit 2*What do we know about damages?*

- Surface waters with alkalinity less than 200 microequivalents per litre (ueq/l) are potentially sensitive to acid deposition; deposition rates of more than 30 kilograms per hectare per year (kg/ha/yr) may cause adverse ecological effects on sensitive aquatic systems, while rates less than 20 kg/ha/yr may cause minimal effects except for very sensitive aquatic systems.
- Currently, 219 U.S. lakes have been identified as having altered fish populations due to acidic deposition, 206 of which are in the Adirondacks Park.
- Adverse effects on forest ecosystems have been observed, but the links to acidic deposition are ambiguous. There is also concern over the potential long-term effects that may be produced in poorly buffered, unmanaged forest soils.
- Adverse effects on acid deposition on crops have been demonstrated at lower than ambient pH values (between 5.0 and 3.0). However, no adverse effects on crop production have been demonstrated at current ambient pH levels.
- Acid precursors (primarily SO₂ and sulphate particles) are major contributors to haze and also contribute to respirable particle concentrations.

Government Response

An aggressive research programme has been undertaken by the U.S. government.³ For FY 1984, the Interagency Acid Precipitation Task Force will spend some \$27 million on an accelerated research programme. Research conducted by the Task Force will form the basis for three major scientific assessments. By 1985, the Task Force will provide estimates of the current and anticipated future damage from acid rain. A second assessment to be completed by 1987 involves the estimation of costs and benefits of alternative control and mitigation strategies. A final evaluation of the scientific and policy questions involved in acid rain will be completed by 1989.

Congressional Response

Congress has introduced 12 bills to address the acid rain issue. The legislation takes two basic approaches: a reduction in emissions of up to 50 percent of current levels, or research. The SO₂ reduction bills are supported by the Northeastern legislators, Canada, and most environmental organizations. The second approach involves research and lake liming as an alternative to reductions in SO₂ emissions. The supporters of research bills generally include the Reagan Administration, the utility industry, most coal interests, the mining industry, and the mine workers.

Legislation which calls for reductions varies in terms of the quantity of SO₂ emissions to be reduced (8, 10, or 12 million tons) and in the period of time over which the reduction is to be accomplished (10 or 12 years). Most, if not all, require additional reductions ("offsets") to compensate for any future emission growth attributable to: (1) new source operations; (2) increases in the production rates, and/or (3) increases in the sulphur content of fuel.

Some legislation allows the use of "emissions trading" by dischargers of SO₂ located within the region or within smaller discrete areas or allows NO_x emissions to be "traded" for reductions in SO₂ emissions. The concept of "emissions trading" assumes that dischargers capable of reducing emissions at relatively lower abatement costs will sell reduction credits to dischargers whose costs of compliance are significantly higher.

The Cost of Acid Rain Legislation

Estimates of the annual costs of 8 million ton and 10 million ton reductions in SO₂ emissions from 1980 levels range from \$2.7 billion (1982 dollars) to \$7 billion (1982 dollars). The results of major cost studies are:⁴

\$2.7 — \$4.7 billion (1982 \$)	— Office of Technology Assessment (10 million ton)
\$2.8 billion (1982 \$)	— National Wildlife Federation (10 million ton)
\$3.3 — \$4.5 billion (1982 \$)	— Environmental Protection Agency (8 million ton)
\$3.5 — \$7 billion (1982 \$)	— Department of Energy (10 million ton)
\$7 billion (1982 \$)	— National Coal Association (10 million ton)

In addition, the Edison Electric Institute has conducted a survey of member companies in an effort to determine the company-specific compliance costs.⁵ The analysis evaluates the expenditures that would be required of 24 utilities. These utilities are collectively responsible for 3.5 million of the required 8 million ton SO₂ reduction. The results indicate that 44 percent of the bill's reduction could be achieved at an initial annual cost of approximately \$5 billion and total capital expenditures of \$15 billion. Exhibit 3 provides estimates of the increase in annual costs on a state-by-state basis for additional SO₂ controls required for utilities and industrial dischargers.⁶ Exhibit 4 provides estimates of the total capital expenditures required by additional SO₂ controls for utilities for the period 1980 through 1995.⁷

Based on Commerce Department data in 1981, the annual expenditure in the United States for SO₂ abatement was \$2.4 billion.⁸ Therefore, the cost of the 8 to 10 million ton reduction, ranging from \$2.7 billion to \$7 billion, will be in addition to current expenditures on existing control measures. With the additional 8 million ton reduction, SO₂ control cost would become \$5.1 billion to \$9.4 billion.

The actual cost of acid rain legislation will depend on a number of factors. Legal and political considerations may play an important role in the selection of compliance options by the utilities and industrial dischargers of SO₂. For example, in some states,

Exhibit 3



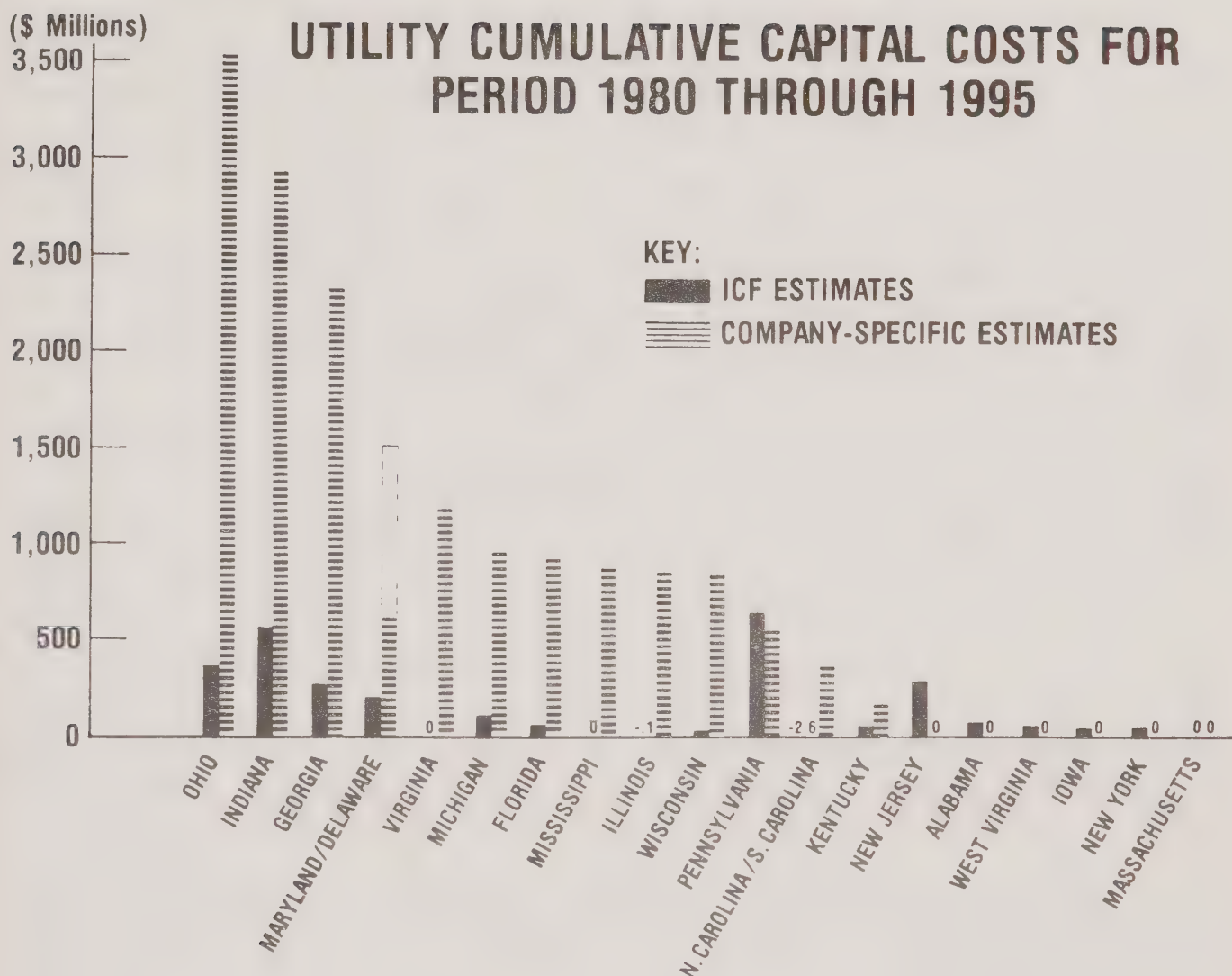
the prospect of fuel switching to low sulphur coals may trigger attempts to mandate local coal use under Section 125 of the Clean Air Act. In others, legislative or administrative limitations on the use of imported coal may be imposed in an effort to ease the dislocation of high sulphur coal markets and to preserve mining industry employment. Finally, the protection of mining employment and mine-related jobs may also be obtained through such technology-based control strategies as scrubbing of coal regardless of sulphur content.

Another possible concern may occur if public utility commissions limit the use of compliance strategies such as emissions trading. These actions may involve substantial domestic rate increases in order to compensate out-of-state utilities for providing emission reductions.

Concluding Comments

Because acid rain will remain an important environmental issue, it is important that a responsible approach be developed. It is critical that any regulatory actions taken by

Exhibit 4



the federal government lead to publicly recognized environmental improvements. Public confidence in the government's ability to address serious environmental problems is undermined if, after regulations are enforced and substantial costs are imposed, there are no apparent gains in environmental quality. Acid rain is clearly a pressing environmental problem as recent reports by the National Academy of Sciences and other groups have confirmed. But, what is not clear, as the Academy's report also confirms, is how best to solve the problem.

FOOTNOTES

1. See, e.g., Labastille, Anne, "Acid Rain. How Great a Menace?" *National Geographic*, November 1981; Council on Environmental Quality, *Environmental Quality-1982: The 13th Annual Report of the Council on Environmental Quality* (Washington, D.C.: U.S. Government Printing Office, 1983), p. 211; *The Economist*, "Criticism Rain Down on Cross-Border Polluters," July 10, 1982, p. 79; *The Economist*, "Acid Rain: More Thunder Than Enlightening," September 17, 1983, p. 89.

2. *Acid Deposition: Atmospheric Process in Eastern North America*, National Research Council, National Academy of Sciences, Washington, D.C., 1983; *1982 Annual Report to the President and Congress*, National Acid Precipitation Program, Washington, D.C., 1983; Press Advisory: Interim Report from the Office of Science and Technology Policy's Acid Rain Peer Review Panel, Executive Office of the President, Washington, D.C., June 6, 1983.
 3. *1982 Annual Report to the President and Congress*, National Acid Precipitation Program, Washington, D.C., 1983.
 4. The major studies are: U.S. Department of Energy, Office of Policy, Planning and Analysis, Division of Environment and Fossil Energy, *Costs to Reduce Sulfur Dioxide Emissions*, March 1982; *Analysis of a Senate Emission Reduction Bill (S. 3041)*, Prepared for Office of Policy Analysis and Office of Policy and Resource Management EPA, by ICF Incorporated, February 1983; Office of Technology Assessment, *The Effects of Acid Rain Control Measures on the Coal Market*, p. 501 of Hearings before the Committee on Environment and Public Works, United States Senate, 97th Congress, May 25 & 27, 1982; National Coal Association Report (Peabody Coal Fact Sheet, 1983).
 5. National Economic Research Associates, Inc., for Edison Electric Institute, a Report on the Results from the Edison Electric Institute Study of the Impacts of the Senate Committee on Environment and Public Works Bill on Acid Rain Legislation (S. 768), June 20, 1983.
 6. ICF, Analysis of a Senate Emission Reduction Bill (S. 3041), Report to U.S. Environmental Protection Agency (February 1983).
 7. *Ibid.*
 8. U.S. Department of Commerce Data used for estimates, *Pollution Abatement Costs and Expenditures, 1980*, A Current Industrial Report, issued December 1981.
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Curb on Noise from Replacement Exhaust Systems

A new British Standard, BS AU 193, *Specification for replacement motor cycle and moped exhaust systems*, provides detailed guidance on the required silencing properties of such systems. It describes methods for measuring the noise emitted by motor vehicles and mopeds equipped with replacement exhaust systems and specifies requirements for the durabilities of fibrous, noise absorbing materials where these are employed to meet the noise limits.

BS AU 193 forms the basis for future legislation which the Government intends to introduce, which will apply noise controls to replacement systems as well as to the whole machine when new. This should effectively curb one of the most irritating rackets on the road: the ear-splitting din caused by sub-standard exhaust systems on motor cycles and mopeds.

BS AU 193 is available from: The Sales Department, BSI, Linford Wood, Milton Keynes MK14 6LE. Price £14.00 (£7.00 to subscribing BS1 members).

NSCA ELECTS NEW OFFICERS

President

At the Annual General Meeting of the National Society for Clean Air, held in Torquay, Monday 31 October, **Professor David G.T. Williams** was elected President of the Society. Professor Williams, who is President of Wolfson College, Cambridge and Chairman of the Faculty of Law at Cambridge University (since 1981) has a particular interest in environmental matters, having been a member of the Clean Air Council from 1971 to 1979, of the Commission on Energy and the Environment from 1978 to 1981 and of the Royal Commission on Environmental Pollution from 1976 to 1983. Professor Williams was invested by the Society's Immediate Past President, Naomi Sargant (Lady McIntosh).

Vice-Presidents

The Rt. Hon. The Earl of Cranbrook, Mr. A. (Mick) Archer, MBE, and Frank Haynes, MP, were elected Vice-Presidents of the National Society for Clean Air at the Society's AGM. Other NSCA Vice-Presidents are (in order of appointment) Mr. Stanley Cohen, CBE, Mr. Madron Seligman, MEP, and The Rt. Hon. Michael Foot, MP.

Chairman of Council

Following the AGM, the Society's governing Council met and elected **Cllr. L. Poole**, BEM, JP, to succeed Mr. W.B. Twyford as Chairman of Council. Len Poole is the first serving elected member to be appointed to this position within the NSCA. He has been Chairman of the Environmental Health Committee, Middlesbrough Borough Council since local government reorganisation, and represents the Society's Northern Division on the national Council. He serves on the South Tees Health Authority, representing Middlesbrough Council, and is a member of the Boroughs of Cleveland Pollution Group (Industrial Pollution). Councillor Poole was responsible for persuading his Council to complete its domestic smoke control programme by the target date of 1979, in spite of financial cutbacks.

CHAIN OF OFFICE

In recognition of Cllr. Poole's outstanding contribution over almost three decades towards the control of air pollution throughout Cleveland, Imperial Chemical Industries PLC (Agricultural Division, Billingham and Petro chemicals and Plastics Division, Wilton) British Steel Corporation, Teesside Division, and Middlesbrough B.C. jointly presented the NSCA with a silver chain bearing the Badge of Office to be worn by the Chairman of the Society's Council. The presentation of the Chain, on which will be inscribed the name of Cllr. L. Poole as the first to wear it, came as a total surprise to Cllr. Poole. It was presented by Cllr. Jim Campbell, representing the Mayor and the people of Middlesbrough, ICI and British Steel, and accepted on behalf of the Society by the outgoing Chairman, Mr. W.B. Twyford. Expressing the Society's deep appreciation of the handsome and generous gift, Mr. Twyford said that the Chain would, in addition to honouring Cllr. Poole, serve to remind the Society of the tremendous strides in air quality improvement achieved on Teesside in the second half of the century.

SCIENCE AND POLICY MAKING IN THE CASE OF LEAD

A note of comment on the article by Michael Rutter, published in Clean Air Vol. 13, No. 1, by R.S. Scorer.

While the article of Michael Rutter is valuable in pointing out the pitfalls open to those who wish to come quickly to a final policy decision about lead in petrol his main argument still remains the very indirect one summed up in his sentence "prudence suggests that it would be unwise to act on the assumption that blood lead levels are now at a level below such a hypothetical safety limit" [a possible threshold below which lead has no adverse effect].

There are, however, several breaks in his argument which consequently does not justify such a conclusion. First, he assumes throughout the discussion that, although he states that no mechanism has been established whereby high levels of lead can cause a lowering of IQ, a correlation between IQ and lead level means that lead is the cause and the change in IQ is the effect. This is in spite of the latest very thorough piece of work which he praises highly but which was, it seems, published too late to be included in his references (Smith, et al. 1983).

It specifically refers to two mechanisms which could make IQ variations cause variations in blood lead. These are the fact that affluence class is correlated with the cleanliness of clothing, living, and play areas and is also correlated with IQ, or to put it crudely — less affluent people lick dirty hands more often, and do less well in IQ tests, and even within a given affluence class the more intelligent would live more cleanly regardless of lead. The second fact is that the children in more affluent households shed their teeth earlier (possibly because of superior nutrition) as recorded by the date of shedding teeth whose lead content was measured in the study. Thus, because older teeth would contain more lead, it would seem that less tooth lead was correlated with higher IQ (which is automatically corrected for age).

The same kind of criticism can be made of the New York study which correlated the increase in lead levels in children tested at random in the streets with the season (they drink more water from lead pipes in the summer and more lead is dissolved at warmer temperatures, and children play more in dusty areas in summer). But more lead was sold in petrol in summer and so that fact was described as the sole cause of the higher lead levels.

Rutter does not emphasise an important fact, that blood lead levels in London children average around 120 $\mu\text{g}/\text{dl}$ which is in great contrast to the levels in most other countries where often it has been found to be around 20. This could be a climatic effect to do with temperature, washing by rain, or average wind strength, but it could also be a measure of the residual lead paint problem, cleanliness habits, and so on. But it certainly is important in making any estimate of what has to be done to achieve a further reduction, and what sort of priority to attach to it in comparison with other effects.

For example, the correlation between affluence class and IQ is much greater than between blood lead and IQ, and if we are at all concerned with IQ levels our first priority

should be either to find out what the children of less affluent parents are lacking and improve their opportunities or to find out whether IQ is after all not a real measure of anything in the brain or of performance potential but a culturally oriented measure, and should not be used at all in the context of lead (or education for that matter). Thus an urban child can easily answer the question "If John set out for home with five pigs from market and lost three on the way how many would he have on arriving home?", but a peasant child would regard the question as stupid, for he would not dare to go home until he'd found the ones he'd lost, and anyway he just wouldn't lose them in the first place. The question of arriving home with less than the five he set out with would not exist. The city dweller, with his greater remoteness from reality, has no difficulty with such a stupid hypothesis.

Rutter has a brief discussion on the question of not making a decision now, which he somehow distinguishes from the decision not to do anything now as if scientists do one and other people do the other. He then says there is no difference, as if that invalidates the decision to do nothing now (because the reasons are not persuasive enough to the decider). Practical scientists do not act in such an evasive way. They try to do a proper cost benefit analysis and not do what according to Rutter "prudence suggests". Prudence can be compelling, and in the case of IQ variations I think that action through lead legislation is very low in the list of priorities. There is much more effective educational and social reform which could with a high degree of certainty improve the performance which IQ has been thought to measure, i.e. something innate. We must, however, beware of placing something of which we have been made aware in our work too high in the list of society's priorities; and if he wants to say what is most prudent Rutter must take off his scientific label and see what other more pressing problems there are requiring attention.

Thus he says that because legislation has been introduced to remove lead from petrol in Germany and U.S. it is economically feasible everywhere else. Those two countries are two which have experienced the recession far less than most and have not yet come down to earth with a bump like many of the rest of us from the rarified atmosphere of "any pollution which can be removed should be removed", which is characteristic of the most affluent societies of the 1960's and 1970's. Furthermore, as is well known, the refinery capacity of the world is much greater than is required because of the recession. Therefore changes in output can be managed fairly easily up to a point without any major capital investment in refineries and the demands of Germany can be met. But if all Europe made such demands for high octane lead-free petrol new investment would have to be made by someone which would not only push up the price more than it has gone up in the case of Germany, but would be a bad investment because, in a decade or so, there will either be a dramatic decrease in consumption because of rising costs of oil or a dramatic change in technology to supply the needs of the transport industry from coal. In either case the enormous investment required to provide universally lead free petrol now is a bad speculation. For the same reason, unless some new confidence comes to the market, a reorientation of our engine production towards low octane fuels would require a gigantic investment at a time when fuel economy is the top priority, and requires a contradictory approach. So we *do* have to consider the expense and compare it with alternative ways of doing good in the world by putting the effort elsewhere.

Rutter uses a quite specious and non-numerical argument about the number of studies which all show the same general conclusion even though they are all bad. He discusses the likelihood that they would all show the same effect if it were not real. The trouble lies in the fact that they were all looking for the same thing, namely a correlation between levels of blood lead formerly regarded as safe (i.e. below 35 $\mu\text{g}/\text{dl}$) and IQ, without considering the mechanisms which might connect them, and which, lead or IQ levels, was the first cause or whether it was neither, and whether it might be best to stop mothers of small children, or indeed all parents and non-parents, from smoking, because the study Rutter unequivocally calls the best clearly gave the important message that smokers and their families have higher blood lead levels.

Nor does he tell us some of the disconcerting things about some of the bad studies. Thus the Turin study which was very expensive and time consuming produced a virtually useless result which is based on about 35 blood samples! This is very definitely too few as a basis for any conclusion. It also showed that the inhabitants of the country villages of Lombardy had levels of lead 50 per cent higher (around 27 $\mu\text{g}/\text{dl}$) than in the city which, on the basis of the kind of argument often used implies that city air is better for avoiding lead! That is not true, of course, and the "peasants" probably get their lead from wine making utensils or something of that kind: surely then the major conclusion of the study should be to get the "peasants'" blood lead levels down as a first priority because it is near to the formerly accepted safe limit now thought unsafe. But no, the issue is lead in petrol and so social priorities are ignored, and Rutter joins the campaign which prejudged the issue long ago when ignorance was rife.

References:

Smith, M., Delves, H.T., Lansdown, R., Clayton, B.E. and Graham, P. (1983) The Effects of Lead Exposure on Urban Children: Institute of Child Health and University of Southampton study.

Developmental Medicine and Child Neurology, Supplement No. 47.

Environmental Award for Industrial Air Pollution Inspectorate

The United Nations Environment Programme awarded its commemorative silver medal to three UK recipients -- HM Industrial Air Pollution Inspectorate, the National Trust and Dr Martin Holdgate CB, Chief Scientist and Deputy Secretary at the Department of the Environment.

The silver medal, which commemorates the 10th anniversary of UNEP (established in 1972 as a result of the Stockholm Conference on human environment), is awarded for "excellence and leadership in the field of the environment during the past decade".

The citation for the first of these awards spoke of the major role that the Inspectorate had played in the development of the UK air pollution control policies and its remarkable work on the control of emissions from large manufacturing industries. The citation The award to Dr Holdgate was made for his personal and direct contribution to the analysis of environmental problems, as well as for his part in the development of environmental policies. Dr Holdgate was one of three noted scientists who compiled and edited

DIVISIONAL NEWS

Northern Division

The Autumn meeting of the Northern Division was held on Friday 16 September 1983 in the Civic Centre Sunderland, with hospitality being graciously extended by the Sunderland Metropolitan Borough Council.

The meeting was chaired by Councillor L. Poole, and attended by the then Chairman of the Society's Council, Mr. W.B. Twyford, and 54 members of the Division. During the business meeting Mr. Twyford gave a report on the activities of the National Council and on the issues then under consideration.

Mr. L. Mair brought to the Division's attention a situation which had developed in the Morpeth area. A local protest group had been instrumental in delaying a possible commencement of a smoke control order which covered the Lynemouth District, despite evidence presented by the Chief Environmental Health Officer and supported by correspondence from Warren Spring Laboratory, showing that that area had pollution levels in excess of the EC Directive limits. After full discussion it was agreed that the Secretary should send a letter to the Chief Executive of Castle Morpeth District Council, stressing the Division's concern at the delay in the implementation of the smoke control order.

After the business meeting, Mr. R. Gilbertson, Environmental Health Officer, Sunderland MBC, spoke on "A Review of a Decade of Pollution Control by several North-East Authorities". Mr. Gilbertson, who has worked for several North East authorities and been involved with the Northern centre Environmental Health Officers Air Pollution and Noise Panel, drew on his extensive and practical experience of the problems to give a very interesting and wide ranging talk. He said that the panel had worked hard over the years and produced publications on pollution matters which had been quite successful in sales to Local Authorities. Subjects covered included smoke control, industrial pollution, the problems associated with quarries, and noise. The panel accepted that coal would be the fuel of the future, but concern had been expressed by its members that growing use of coal on appliances which were not properly designed would lead to an increase in levels of pollution, particularly in SO₂. In that connection, Mr. Gilbertson raised the question of whether or not the Division considered that the Dark Smoke (Permitted Periods) Regulations 1958 should be updated.

Mr. Gilbertson referred to the practice of burning materials in the open and to the difficulties caused by straw and stubble burning, drawing members' attention to the severe road accident which had occurred in the area because of smoke spreading across the road from a stubble burning fire.

On the subject of lead, he referred to the work of several North-East local authorities

in surveying and monitoring their areas to determine the incidence of lead, particular emphasis being placed on monitoring in and around the older primary schools.

There was sufficient evidence of problems arising from mineral extraction, in addition to open-cast coal mining, to have prompted the panel to produce the publication "Quarries and the Local Authority", which was intended to assist those authorities which were experiencing difficulties with the industry.

Summing up, Mr. Gilbertson said that the past 20 years had seen many changes; many of which were certainly for the better as far as the environment was concerned. However, while the environment had, at times, remarkable powers of recovery, it should always be remembered that we only had one earth and that it required the activities of environmental health officers constantly to protect this heritage. In an expanding technological world, it was imperative that modern technology be employed in the protection of the environment. He felt that greater use could be made of computer data banks.

Mr W.A. Waite, representative of the Coal Merchants' Federation, proposed the vote of thanks to Mr. Gilbertson and congratulated him on his depth of knowledge. He particularly complimented his practical approach to problems and assured all the members that the Coal Merchants' Federation was completely in sympathy with the aspirations of Local Authorities with regard to improvements in environmental air quality.

W.C. Robson
Hon. Secretary

East Midlands Division

Some forty-five members attended the meeting held at the Fishpond Hotel set in the Derbyshire countryside, on Thursday, 8 September 1983. Attendance was less than the usual, no doubt reflecting the fact that the meeting fell during the week of the IEHO Conference.

After coffee by kind invitation of West Derbyshire District Council members assembled for the meeting. A Civic welcome was extended by the Chairman of the West Derbyshire DC, Councillor G. Stevens and thanks for this were expressed by the Chairman.

From the floor, Mr. K.R. Enderby, Chief Environmental Health Officer of Peterborough, raised the matter of stubble burning and recounted the very grave nuisance which had resulted during 1983 on numerous occasions in the Peterborough Area. The Association of District Councils had been asked to invite other authorities to lobby Members of Parliament. Mr. Enderby moved that the meeting invite the Council of the Society to reaffirm its concern, and to maintain the pressure for a ban on stubble burning. This was seconded by Cllr. Mrs. E.J. Inglefield. Several other speakers contributed to the debate, all supporting the motion which, when put to the vote, was carried *nem con*, most, if not all present, voting in favour. The Secretary asked that details of individual complaints should be sent to Headquarters.

The Chairman then introduced Mr. R.N. Goodchild, Technical Manager of H.J. Enthoven & Sons Ltd. Mr. Goodchild said that Enthoven had been in the secondary smelting business for a long time and originally came to Darley Dale to escape the blitz, taking over some premises which had closed in 1939. The firm had a capacity for 60,000 tons of lead per annum, and whilst they were equipped to deal with lead, lead alloys and solder, in practice 70% of their throughput came from battery scrap. With the aid of a flow chart, Mr. Goodchild explained the process carried on at the works.

After Mr. Goodchild's introduction, Mr. P.A. Williamson, an Environmental Chemist with the Company, gave a very full illustrated talk on the monitoring procedures carried out by the company. Mr. Williamson dealt with four main areas of concern — Workplace Air, Community Air/External Environment, Effluent (with particular reference to the Severn Trent consent conditions) and also with Solid Wastes.

The degree of interest was reflected in the lively question time that followed and the discussion had to be curtailed because of the timetable. The thanks of the meeting to Mr. Goodchild and Mr. Williamson were voiced by the Chairman and supported by applause.

This concluded the morning's proceedings and members were then invited to partake of an excellent buffet lunch, kindly provided by the Chairman and members of the West Derbyshire District Council.

In the afternoon, those present divided into two parties, one of which went to the works of H.J. Enthoven and Sons, whilst the second party visited the Tarmac Roadstone limestone mine at Middleton by Wirksworth.

E.F. Raven
Hon. Secretary

London, South East and Central Southern Division

Visit to London Brick Company, Stewartby, Bedfordshire

On Thursday 5th July 1983 the Division was the guest of the London Brick Company at their works at Stewartby, Bedfordshire. A party of twelve members was taken over the works to see each stage in the production of bricks, ranging from the mixing of raw materials, kiln-firing, finishing and final despatch, to the disposal of waste products. The Division was also given a filmshow on brick production. Afterwards, an excellent buffet lunch was provided which was followed by a visit to the Company's research and development laboratories.

The visit was extremely informative, and it was particularly interesting to see an industry, still using traditional methods, being aided by modern technology to reduce pollution. A vote of thanks was extended to the London Brick Company for their hospitality by Mr K. Dorman on behalf of the Division.

J.J. Beagle
Hon. Secretary

OBITUARIES

J.S. CARTER, CBE

We regret to report the death, in October 1983, of Mr. J.S. Carter, CBE, Chief Alkali and Clean Air Inspector from 1955 to 1964 and a long-standing member of the National Society for Clean Air.

Mr. Carter saw through the consolidation of the Inspectorate and its adaption to new developments in industry. When he took over as Chief Inspector, he had a small team, but with the considerable additions to the schedule of registered works in the late 1950s, the strength of the Inspectorate was increased substantially and the districts in England and Wales increased in number from 7 to 12. By 1960 the Chief Inspector was assisted by two deputy Chiefs, twelve District Inspectors and ten Inspectors. Mr. Carter had to contend with increasing political discussion of the Inspectorate's role, both in relation to the processes it controlled and in respect of overlap with local authority powers. As Lord Ashby wrote: "The Alkali Inspectorate reacted sensibly to this growing interest in its affairs. Faithfully every year, (Mr.) Carter reported the number of complaints that inspectors had received. He never ducked the complaints." (Eric Ashby and Mary Anderson: *The Politics of Clean Air*, Oxford University Press, 1981).

Indeed, Mr. Carter's time as Chief Inspector saw the beginning of mass concern for the environment; and his great success lay in achieving an expansion of the role of the inspectorate, while at the same time defending the timeless appropriateness of the best practicable means policy of control.

Dr. E.T.J. FUGE, OBE, PhD, BSc.

It is with great regret that we record the death of Dr. Trevor Fuge, H.M. District Alkali and Clean Air Inspector for the North and North-East of England for some 24 years until his retirement in April 1983.

Dr. Fuge's contribution to the cause of pollution control is well known both to those in his district and to those outside it, and was recognised by the award of an OBE. His career began in industry and he brought to the pollution control world a high level of technical and practical knowledge. To those attributes were added the rare qualities of principle and courage — courage which was all too evident as he bore so well a very serious illness. He will be missed by many, but forgotten by few for whom his work will live on, particularly those in local government with whom he came in contact and those on Teesside where his contribution to pollution control was so marked.

We offer our sincere condolences to his wife and family.

INDUSTRIAL NEWS

Low Level Sulphur Dioxide Analyser

An extremely sensitive, selective and fast response instrument for measuring SO_2 in air on a continuous basis is now available from Severn Science. The instrument was developed following research work undertaken by the Central Electricity Research Laboratories, Leatherhead, and the commercial version is manufactured under licence from the CEEB.

The instrument features linear response over the concentration range 0-100 ppb, a detection limit of 0.2 ppb, and a response time of 1 - 2 minutes. It is highly selective, making no response to sulphate and being insensitive to other likely atmospheric pollutants.

No hazardous gases are required for operation. Sample air is bubbled through a small volume of conditioned mercury (I) nitrate solution contained in a reaction vessel held at 40°C . The mercury vapour released (picogram quantities) is swept from the solution by the same flow of sample air, dried, and then determined by measuring the absorption occurring at 254 nm. The instrument is calibrated by passing known concentrations of sulphur dioxide through the instrument from a permeation tube calibrator. Similarly, zero checks can be made using SO_2 free air in place of the sample gas.

One gas pump is used to draw the sample gas as well as air for the conditioning vessel and for the Perma driers; a four channel peristaltic pump controls the liquid flows. Sample measurement periods

can be adjusted at one minute increments up to 999 minutes; after each sample period the instrument automatically undergoes zero and calibrate functions unless manually overridden. The zero and calibrate times are adjustable between 10 and 90 minutes and the calibrate cycle can be missed for as many as 32 times if required.

Reader Enquiry Service No. | 8324

New Isocyanate Monitoring Service

The Rubber and Plastics Research Association has introduced a new monitoring service in response to the revised control limits for isocyanates in air adopted by the Health and Safety Executive in 1983.

The new limits refer to the total isocyanate concentration, i.e. the sum of all isocyanate species including monomers and prepolymers, rather than to individual compounds. The maximum allowable concentration of total isocyanate groups in air is 0.02 mg per cubic metre for an eight-hour time weighted average and 0.7 mg per cubic metre for a ten-minute time weighted average.

The new RAPRA service can be used in two ways. On-site factory visits can be made and air samples taken for subsequent analysis at Shawbury. Alternatively, companies may bring their own samples to Shawbury for investigation.

In both cases the samples will be analysed by High Performance Liquid Chromatography using ultra-violet and electrochemical detectors. Quantification is by

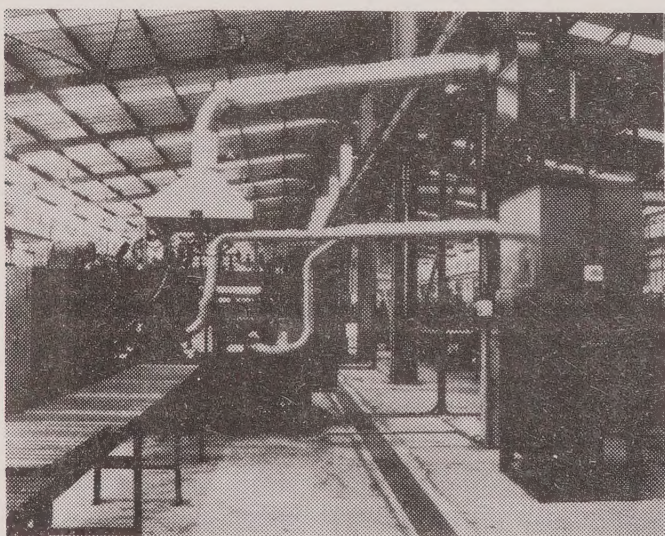
standard samples prepared from pre-polymer preparations of known isocyanate content, which in turn have been quantified using the appropriate monomer standard.

Reader Enquiry Service No. **8325**

Longhurst System beats Air Pollution Problems

Longhurst Bros. & Beale Ltd. have designed a range of fume extraction systems for such applications as welding and spray booths, metal profile cutting, solvent tanks, printing equipment, cleaning and finishing processes, particle board presses and any situation where fume emissions may be a fire risk or a danger to health.

The systems can be supplied in PVC dipped mild steel, which has the advantage of strength plus an impervious coating to give long, trouble-free life. Alternative materials include stainless steel or black mild steel protected with acid resistant paint.



They incorporate all the necessary ducting, hoods and fans for general ventilation, crossflow ventilation, or spot ventilation of specific work areas, machines and equipment.

Longhurst wet fume scrubbers can also be built into the system. They clean the air rapidly by a thorough intermixing of water and fume-laden air as it passes through a high velocity water curtain. Fumes and fine dust are separated from the air and removed, while cleaned air is released.

The Longhurst fume extraction systems are purpose built and meet the requirements of the Health & Safety at Work Act for the elimination of solvent, chemical and acid fumes, as well as dangerous exhaust gases and fine powder dust. Maintenance is minimal.

Reader Enquiry Service No. **8326**

Progress in evolving a Hybrid Vehicle Fleet

The Commission of the European Communities (CEC) is contributing a third of the cost of a £600,000 programme undertaken by Hybrid Vehicles Ltd. (UK) to build and demonstrate fleets comprising ten Midibuses (35 passenger) and ten light vans.

This will be the first demonstration of its kind anywhere in the world to prove a hybrid electric system which has been designed specifically for the transport operator.

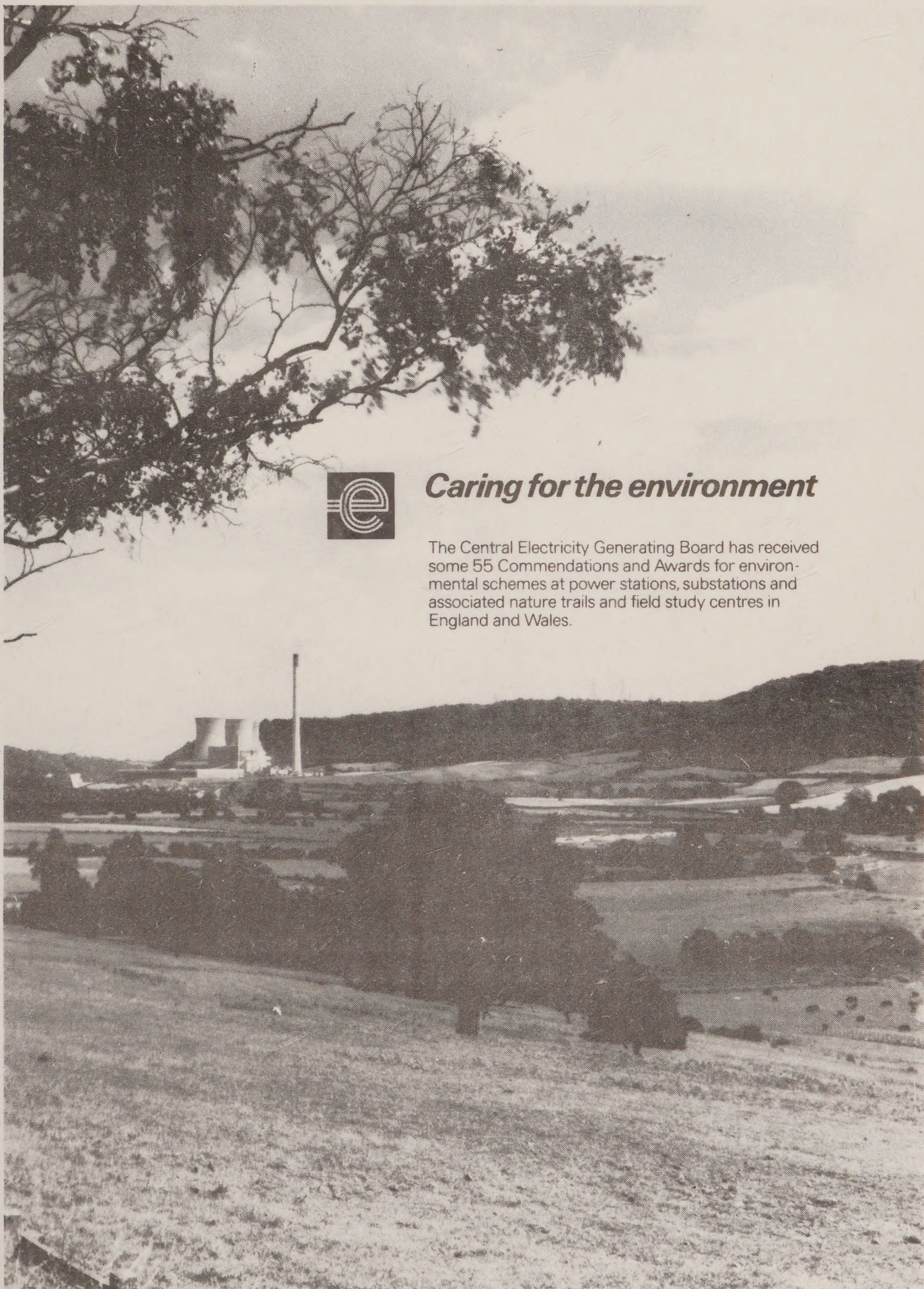
The programme will lead the way to larger scale commercial production and use, having been approved by all the European Member States including the United Kingdom. Within this country, the Departments of Energy, Industry and Transport have given the project priority rating.

Reader Enquiry Service No. **8327**



Caring for the environment

The Central Electricity Generating Board has received some 55 Commendations and Awards for environmental schemes at power stations, substations and associated nature trails and field study centres in England and Wales.



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